

2015-2016 Water Year Report

Summary of Thurston County Precipitation, Groundwater, Stream and
Lake Data from October 2014 to September 2016

Thurston County Water Resources – Environmental Monitoring Program



April 2017



Acknowledgements:

Thank You to the following people who greatly assisted in preparing this report

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SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow,
Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

Contents

Executive Summary	1
General	1
Weather and Atmospheric Monitoring	3
Notable Events	3
Drought (March-December, 2015)	3
Status and Trends	4
Wet Early On.....	4
Stations and Equipment	5
Other Notable Attributes of 2015 and 2016 Water Years:	13
Frost Free Days	13
Atmospheric Rivers (ARs) and Shifts in Temporal Distribution of Rainfall	13
Streamflow	15
General	15
Inter-Local Monitoring Agreement Streams	16
Water Year 2015 and 2016 Observations	16
Rivers	19
Water Temperature.....	20
Groundwater	21
General	21
Groundwater Levels for the 2015 -2016 Water Years (Salmon Creek Basin)	22
Lakes – Lake St. Clair, Long Lake and Black Lake	25
Overview.....	25
Observations.....	25
Lake St Clair	25
Long Lake	27
Black Lake	28
Summary of Water Year 2015 and 2016	30
Closing	30
Appendix A	
Appendix B	
Appendix C	
Appendix D	

Table of Figures

Figure 1: Map of Monitoring Locations - All (2017)	2
Figure 2: Humidity – Measured at Thurston County Complex in Olympia.....	3
Figure 3: National Oceanic and Atmospheric Administration (NOAA) ten year average, range and Water Year 2015-2016 comparison chart.	5
Figure 4: Precipitation and Atmospheric Data Collection Stations	6
Figure 5: Rainfall Distribution Chart by Station WY 2015	8
Figure 6: Deviation from Long Term Average Chart WY 2015	9
Figure 7: Rainfall Distribution Chart by Station WY 2016	10
Figure 8: Deviation from Long Term Average Chart WY 2016	11
Figure 9: Streamflow Data Collection Stations ALL (ILMA and GEM).....	16
Figure 10: Black Ditch Outlet (44a) - WY 2015 Stage and Temperature Data Chart	17
Figure 11: Black Ditch Outlet (44a) - WY 2016 Stage and Temperature Data Chart.....	17
Figure 12: Woodland Creek (18a) WY 2015 at Pleasant Glade Rd - Stage and Temperature Chart	18
Figure 13: Woodland Creek (18a) WY 2016 at Pleasant Glade Rd - Stage and Temperature Chart	18
Figure 14: Examples of Stream Stages for Water Years 2015 and 2016 in other Creeks in Thurston County – Eaton Creek (10a) flows into Lake St Clair, Woodard Creek (20a) flows to Henderson Inlet.....	19
Figure 15: Location of Groundwater Monitoring Wells in the Salmon Creek Basin.....	21
Figure 16: Groundwater well elevation data from LRS-08, Walter Court SW.....	22
Figure 17: Groundwater Elevations for the Eastern Basin Groundwater Monitoring Wells (Interstate 5 to Brooks Ln SE)	23
Figure 18: Groundwater Elevations for the Western Basin (Interstate 5 to Littlerock Road).....	24
Figure 19: Lake St. Clair Surface elevation Chart 1988 - 2016.....	27
Figure 20: Long Lake Surface Elevation Data 2011 – early 2017.....	28
Figure 21: Stage Chart for Black Lake for Water Years 2015 and 2016. There is a noticeable difference in the lake level between the two years in magnitude, shape, and duration of the distribution curve. The repeated peaks and drops of the level in the summer months is due to very active beaver dam construction and removal from the Black Ditch Outlet.....	29

SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow,
Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

List of Tables

Table 1: Summary of Monitoring Stations.....2

Table 2: Precipitation Amounts October, November and December from the Olympia Airport Compared to
Average over the past 65 years4

Table 3: Precipitation Stations Location and individual Rainfall Amounts.....7

Table 4: Precipitation Station ID and Location 12

Table 5: Average Number of Frost Free Days 1901 – 2016 for the Olympia Vicinity 13

Table 6: Climate Averages for Olympia 14

Table 7: Urban/Sub-urban Streams included in the Inter-Local Monitoring Agreement 15

Executive Summary

The Thurston County Water Resources, Environmental Monitoring Program is responsible for installing, maintaining and collecting data from over 80 fully functional monitoring stations placed throughout Thurston County to monitor atmospheric conditions, streamflow, and groundwater and lake levels. About one quarter of these monitoring stations are part of an Inter-local Monitoring Agreement (ILMA) between Thurston County, the Cities of Lacey, Tumwater and Olympia. This report contains mostly volumetric data relating to volumes and quantities and not chemical parameters of the waters of the County. The Thurston County Environmental Health Division collects and presents chemical and biological parameter data as their major contribution to this annual report. That data is available as a supplemental report in conjunction with this document.

The program began in the early 1990s and has provided our partnership with millions of data records since its inception. The data is used to gage the condition of our water resources in the northern part of Thurston County and within the jurisdictions of the cooperative partners. The cost of the ILMA is divided between the partners based on the number and type of equipment that is located within their respective boundaries. This data is shared between all partners and posted online for review and downloading. This data is useful for not only general health of our systems but also for engineering and flow modeling for basin planning.

In addition to the ILMA, Thurston County also maintains a larger program called the General Environmental Monitoring (GEM) Program. This concurrent program contains the bulk majority of the 86 stations that the County has deployed throughout Thurston County. This program has grown steadily since its founding in 2000. The purpose of the wider GEM program is to evaluate all aspects of the water cycle and for specific, detailed high resolution models for analysis of atmospheric conditions, streamflow stages and volumes, and groundwater and lake levels. The data collected from both the ILMA and the GEM are maintained by Thurston County and provided to our partners and the public online.

For the purposes of dissemination of data, this report is prepared to provide a summary of findings for the stated period of record. Thurston County has elected to include both the ILMA data and the GEM data as an adjunct in this report to provide a complete picture of the water cycle and how this resource is distributed, and how water flows, from the clouds to the Sound and what the water does on its journey. Therefore including all of the data for discussion presents a more holistic view of our precious water resources.

This report is a summary of the Water Years 2015 and 2016. It also contains long term record where the period of record is important to include to provide a wider perspective to the subject water years. Running averages are also used as comparison values for many sites to compare and contrast WY 2015 and 2016 with the historic values. The data presented in this report as well as all other data Thurston County collects and maintains is available at <http://www.co.thurston.wa.us/monitoring/index.htm>

General

In water years 2015 and 2016 (October 1, 2014 – September 30, 2016), the Resource Stewardship, Water Resources Division collected data from 86 monitoring sites across Thurston County.

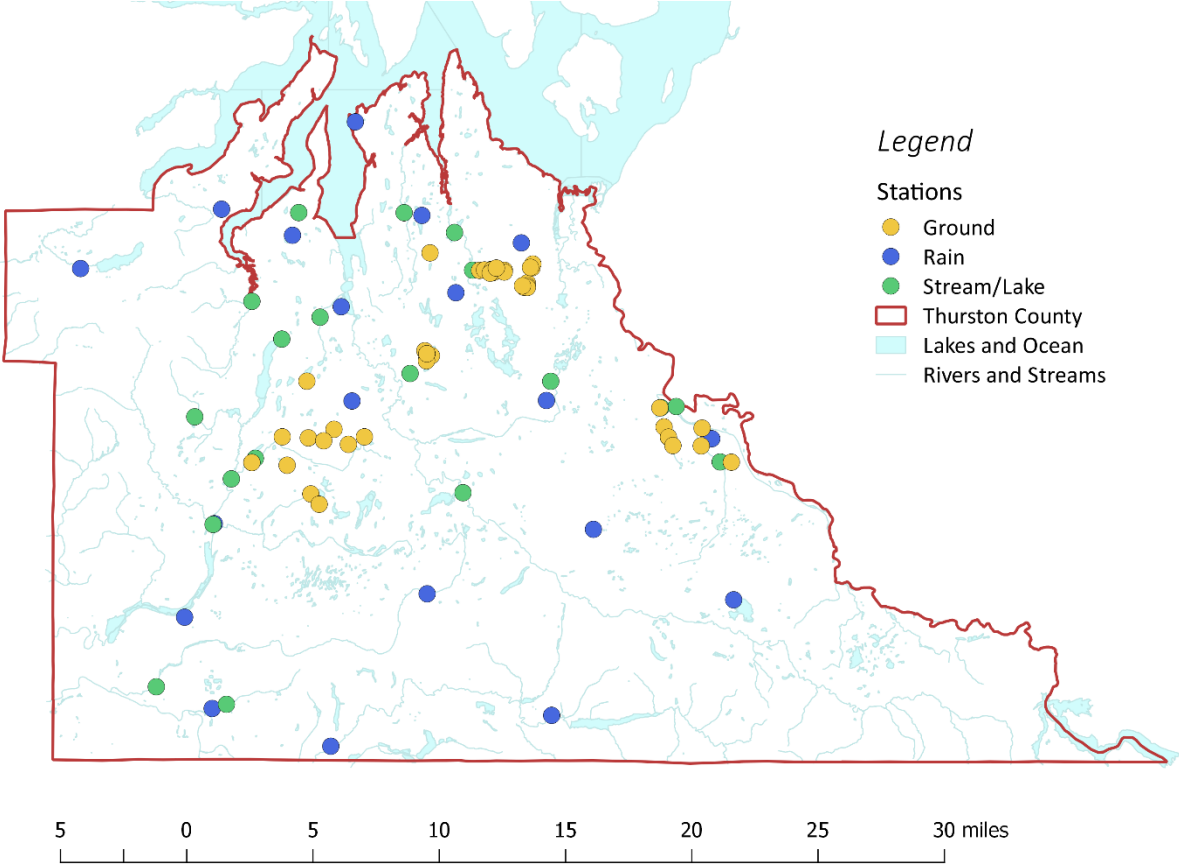
Below is a summary table and map of the locations and type of monitoring stations we currently have active in the field as of January 1, 2017. There are additional streamflow and atmospheric sites planned for 2017 and 2018. These will be included in future reports as data becomes available.

SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow, Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

Table 1: Summary of Monitoring Stations

Type	Count
Weather and Atmosphere	19
Surface Water (Stream and Lake)	21
Groundwater	46
Total	86

Figure 1: Map of Monitoring Locations - All (2017)



Weather and Atmospheric Monitoring

Notable Events

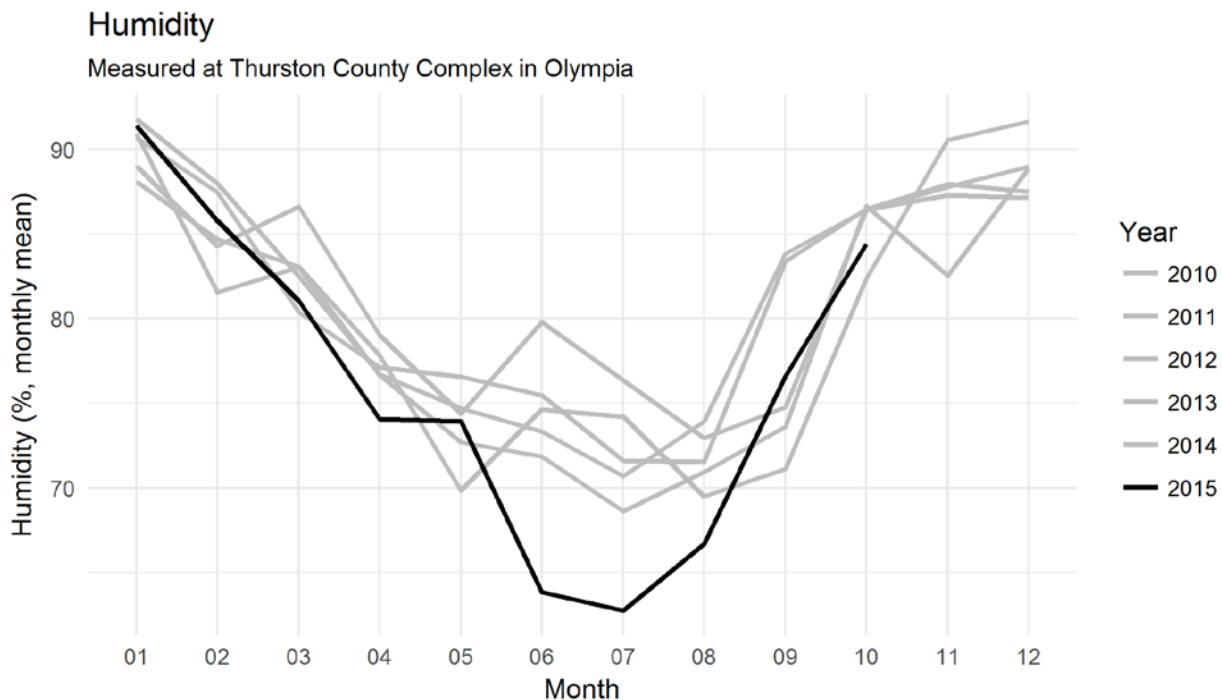
Drought (March-December, 2015)

Low snowfall in the winter of 2014-2015 brought low snowpack in the Cascades and Olympics, and by March of 2015 meteorologists were predicting a drought for many parts of Washington. By May, the Governor had declared a statewide drought emergency, which lasted through the end of 2015. Low snowfall does not typically affect Thurston County because there are only two rivers, the Nisqually and the Chehalis that derive all or some of their baseflows from snowmelt. The drought however was widespread and did affect, to some extent, every surface and groundwater site in the County.

January through April 2015 rainfalls were significantly lower than usual across the county. For most parts of the state the issue was receding groundwater and dry streams. Groundwater levels in Thurston remained within historical averages, and streams and rivers continued to flow. Stream and River levels, however, were below to much below normal as described by the National Weather Service. The drought report is included in Appendix B - “2015 Summary of Drought Conditions for Thurston County, Washington.”

The lack of rainfall was not unprecedented in our 110 years of record (the driest year on record was 1944 with only 26 ½ inches of rain) and that is not what made the drought of 2015 so remarkable. There were many unusual aspects of the drought that were not seen in the previous record. Among those were the sustained high day and night time temperatures and record low humidity. There is a detailed account of the 2015 drought included in Appendix B.

Figure 2: Humidity – Measured at Thurston County Complex in Olympia



SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow,
Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

Although the drought was predicted to extend through Water Year 2016 because of a record El Nino that developed in the tropical Pacific, this was not the case and by early summer 2016 the drought had dramatically faded with cooler and wetter conditions setting in for much of the rest of the summer and fall months of Water Year 2016.

Status and Trends

Wet Early On

Both Water Years 2015 and 2016 began with well above average rainfall beginning in October. The beginning months of our water years have generally been stable and gradually ramp up in November and December. The anomalously high October rainfall did not continue into November and December in 2015 and the trend actually decreased in November and December of 2015. In 2016 however, November and December were well above average rainfall. The two tables below summarize the early part of the water years 2015 and 2016 compared to the historical average.

As noted above, the general trends for all of our stations has been a distinct shift in precipitation from the middle of the wettest part of the water year, from November 1 through January 31, to earlier in the water year. We observed this overall temporal shift beginning in 2005 and remaining consistent through the current water year. The overall yearly average precipitation has remained about the same as in the past 20 years but it is moving to earlier in the water year or later near the end of the wet season. The implications of this temporal shift are primarily seen in elevated aquifers early in the Water Year that remain elevated throughout the wet season. If there is a higher than average rainfall year, as was seen in WY 2016, there could be late season flooding due to increased precipitation in September/October and again in March.

The trend towards earlier onset to the rainy season can have profound impacts on aquatic species with potentially higher streamflows and sediment and pollutant transport during spawning season for salmonids.

Table 2: Precipitation Amounts October, November and December from the Olympia Airport Compared to Average over the past 65 years

Olympia Airport	October	November	December
WY 2015	6.91	6.13	6.00
WY 2016	6.44	12.01	14.50
Average 1951 - 2016	4.61	8.62	7.44

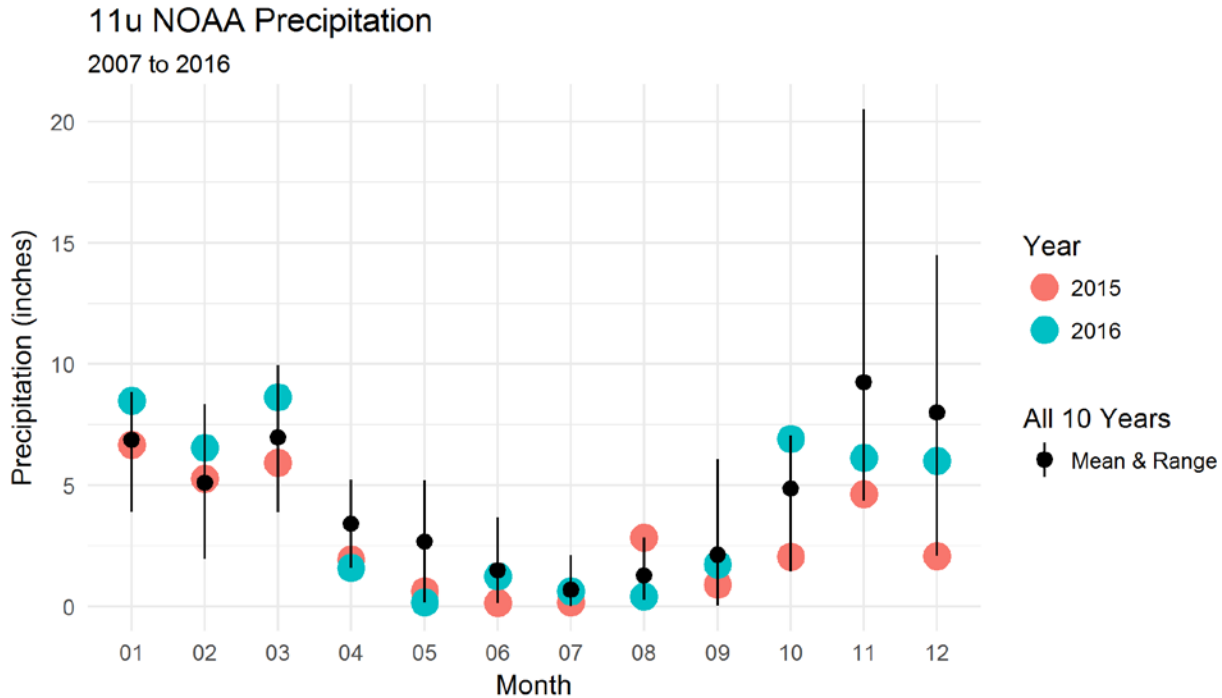
In the table above, the deviation from the cumulative average precipitation from the Olympia Regional Airport can be seen. Water Year 2015 began above average in October but fell below average by November and December. Water Year 2015 was below average for the water year by 8.5 inches. Water Year 2016 on the other hand started out above average and remained so until April ending the year at 62.34 inches - ten inches above average.

To sum up the results for both years: Water Year 2015 was generally drier than normal, while Water Year 2016 was ten inches above average. Looking at precipitation records going back to 1898 there is no consistent pattern between years when calculating precipitation. It is not uncommon to have one year significantly above the annual average while the following (and/or the preceding) year is significantly below the 52 inch running average. When trying to identify a consistent pattern between 2016 and 1898, there is almost no correlation or long term trend to be made. There are some decades that tend to be wetter or drier than normal but

SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow, Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

statistically correlations between individual water years is very low. As stated earlier the only deviation that is emerging is in the temporal distribution of rainfall.

Figure 3: National Oceanic and Atmospheric Administration (NOAA) ten year average, range and Water Year 2015-2016 comparison chart.

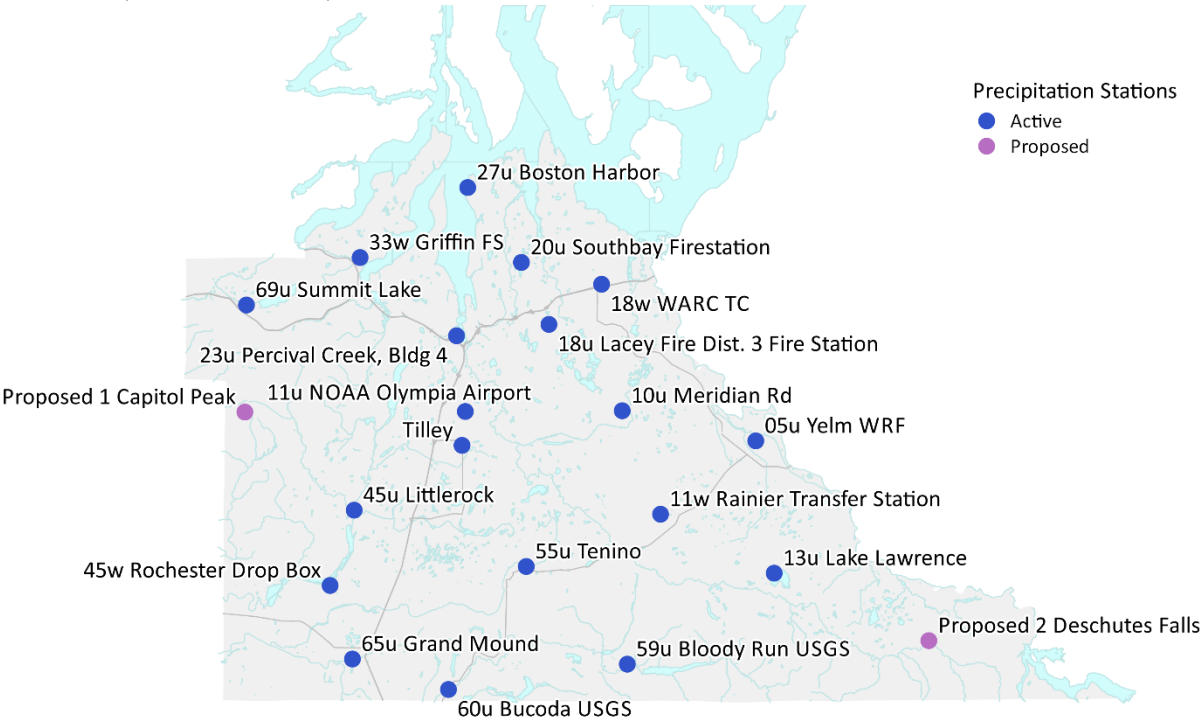


Stations and Equipment

Thurston County monitors rainfall at 19 sites. Some sites were established as recently as 2013; others have data extending back to 1988. NOAA has maintained records at the airport since 1955. We employ several types of sensors to collect a multitude of atmospheric parameters. The most common type of precipitation station collects rainfall and temperature. Several locations collect multi parameters including barometric pressure, solar radiation, wind speed and direction. Two stations also calculate and report irradiance and evapotranspiration (ET). Two of the multi-parameter stations, Thurston County Building 4 West Olympia (23u) and Thurston County Emergency Operations Center, report real time data online.

SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow, Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

Figure 4: Precipitation and Atmospheric Data Collection Stations



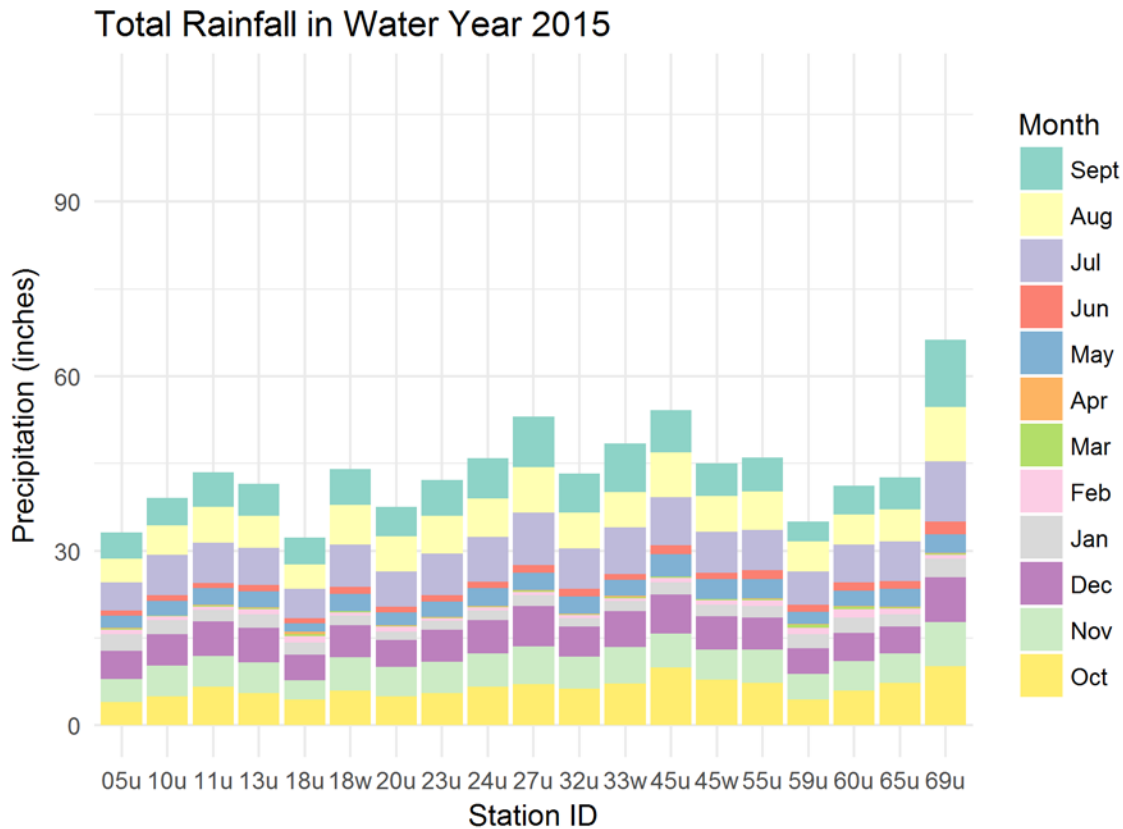
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Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

Table 3: Precipitation Stations Location and individual Rainfall Amounts

ID	Name	Begin Year	Span	2015 Total Precip	2016 Total Precip
05u	Yelm WRF	2008	8	33.1	48.3
10u	Meridian Rd	1995	21	39.1	59.7
11u	NOAA Olympia Airport	1955	61	43.5	62.3
11w	Rainier Transfer Station	2013	3	41.5	58.8
13u	Lake Lawrence	1992	24	32.3	49.7
18u	Lacey Fire Dist. 3 Fire Station	2009	7	44.1	62.7
18w	WARC TC	2000	16	37.6	54.0
20u	Southbay Firestation	2008	8	42.2	59.3
23u	Percival Creek, Bldg 4	1988	28	46.0	70.0
24u	24u McLane/Black Lake Firestation 91	2012	4	53.1	77.4
27u	Boston Harbor	2008	8	43.3	64.7
33w	Griffin FS	2006	10	48.5	74.9
45u	Littlerock	1988	28	54.2	80.2
45w	Rochester Drop Box	2009	7	45.1	65.0
55u	Tenino	1994	22	46.0	61.3
59u	Bloody Run USGS	2009	7	35.0	49.8
60u	Bucoda USGS	2009	7	41.2	55.4
65u	Grand Mound	2006	10	42.6	59.3
69u	Summit Lake	1993	23	66.3	100.9

SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow, Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

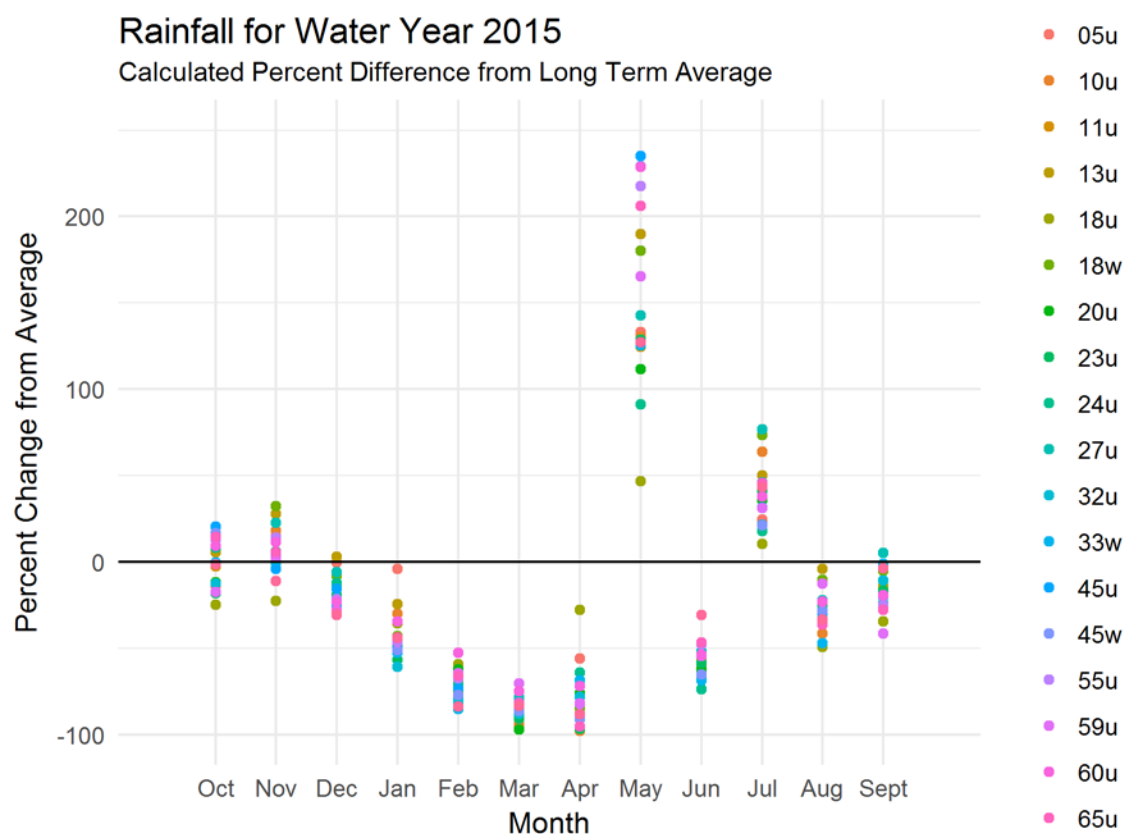
Figure 5: Rainfall Distribution Chart by Station WY 2015



The distribution of rainfall between stations in Water Year 2015 was normal, with the south and east generally drier than the north and west. 69u, the Summit Lake gage, was much wetter than most other gages throughout the county, demonstrating the ability of the Black Hills to wring moisture out of the air as it travels east. By the time storms arrive near Yelm (05u) and Rainier (11w), much of the water has already precipitated, leaving those areas drier than the rest of the county. Station 45u (Littlerock) has significantly more precipitation than station 45w (Rochester), despite a distance of only approximately 5.5 miles between them, demonstrating the complexity of the precipitation patterns around the Black Hills and the Chehalis River gap on the west side of the county.

SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow, Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

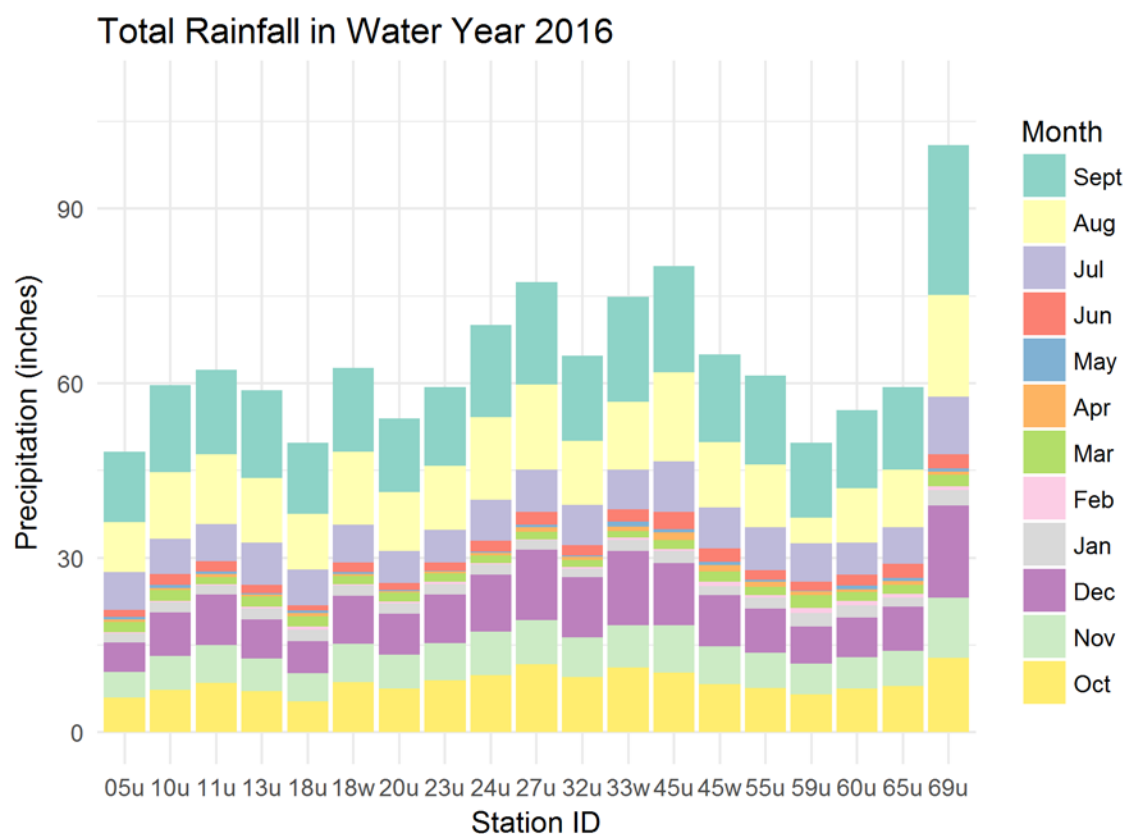
Figure 6: Deviation form Long Term Average Chart WY 2015



The first three months of WY 2015 (October – December of 2014) were relatively normal, but as drought set in across the state monthly rainfall totals across the county began to reflect that. Late winter through the summer (January – April 2015) dip into much lower rainfall values than usual. In the graph above, -100 means no rainfall (down 100 percent from the average, so 0). Precipitation in May was anomalously high across the county, contrary to the general trend for WY 2015.

SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow, Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

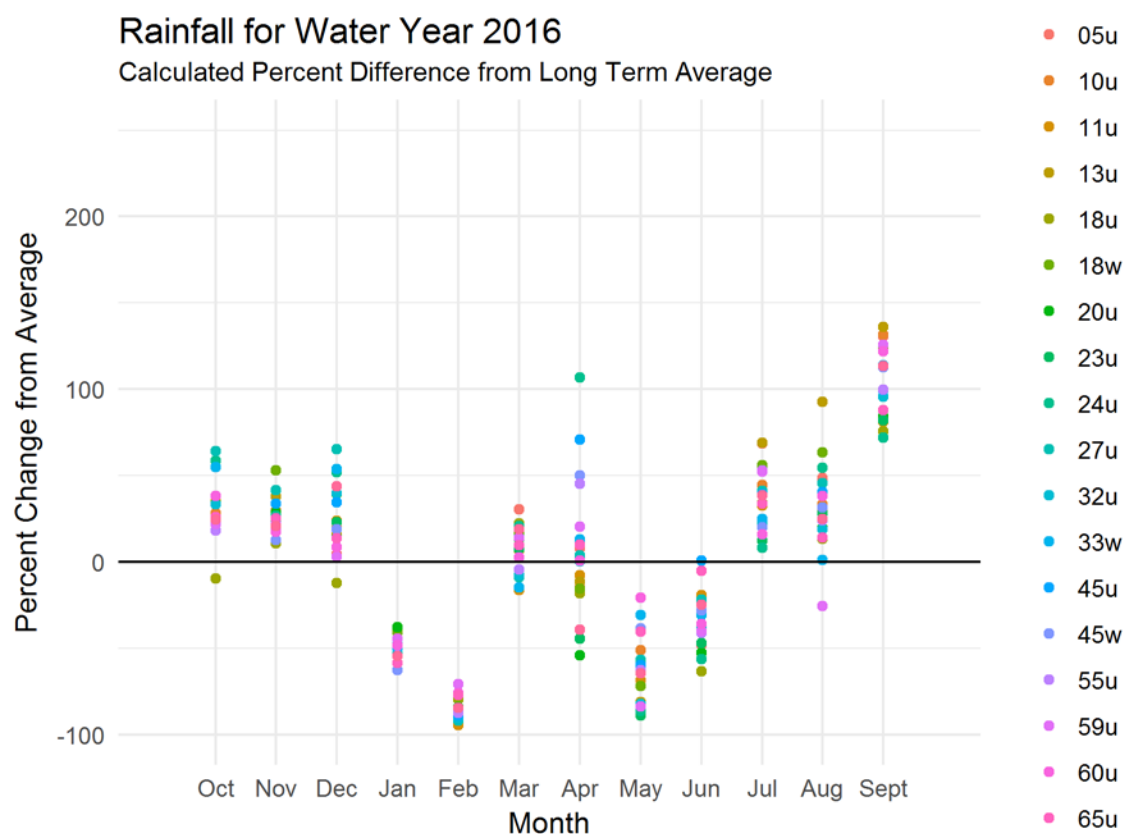
Figure 7: Rainfall Distribution Chart by Station WY 2016



Precipitation distribution between stations in WY 2016 generally mirrored distribution in WY 2015, with some notable differences. Both 60u (Bucoda) and 55u (Tenino) were drier in WY 2016 than in WY 2015 relative to other stations in the county, despite all stations receiving more rainfall in WY 2016; they were 6th and 15th driest in WY 2015, respectively, but 5th and 10th driest in WY 2016.

SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow, Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

Figure 8: Deviation from Long Term Average Chart WY 2016



WY 2016 displayed no consistent trend, with several months drier than average and several months wetter than average. Rainfall on the last month of the water year (September 2016) was much higher than usual across the county, but did not match the extreme anomaly of May 2015. On average, stations received 145% more precipitation in WY 2016 than they received in WY 2015.

SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow,
Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

Table 4: Precipitation Station ID and Location

Site	Operator	Longitude	Latitude	Start Date	End Date
05u: Yelm WRF	TC	-122.59726	46.95176	2008-10-01	
10u: Meridian Rd	TC	-122.73863	46.97402	1995-10-01	
11u: NOAA Olympia Airport	NOAA	-122.90492	46.97374	1955 -2017	
11w: Rainier Transfer Station	TC	-122.69844	46.89890	2013-04-03	
13u: Lake Lawrence	TC	-122.57851	46.85780	1992-01-13	
18u: Lacey Fire Dist. 3 Fire Station	TC	-122.81610	47.03678	2009-01-01	
18w: WARC TC	TC	-122.76009	47.06578	2000-08-05	
20u: Southbay Fire station	TC	-122.84514	47.08173	2008-10-06	
23u: Percival Creek, Bldg. 4	TC	-122.91413	47.02865	1988-03-01	
24u: McLane/Black Lake Fire station 91	TC	-122.97679	47.04601	2012-08-27	
27u: Boston Harbor	TC	-122.90205	47.13611	2008-11-26	
32u: Kaiser Rd	TC	-122.95583	47.07019	1990-06-22	2013-01-29
33w: Griffin FS	TC	-123.01648	47.08536	2006-10-31	
35u: Steamboat Island Bridge	TC	-122.94046	47.18196	2010-05-18	2010-06-21
45u: Littlerock	TC	-123.02264	46.90223	1988-03-01	
45w: Rochester Drop Box	TC	-123.04808	46.84762	2009-07-27	
55u: Tenino	TC	-122.84066	46.86129	1994-10-01	
59u: Bloody Run USGS	USGS	-122.73417	46.79028	2008-2017	
60u: Bucoda USGS	USGS	-122.92306	46.77222	2008-2017	
65u: Grand Mound	TC	-123.02449	46.79429	2006-06-07	
69u: Summit Lake	TC	-123.13703	47.05085	1993-11-01	
PBL2: Capitol Forest Tacoma Trail Cruisers	TC	-123.08315	46.95737	1994-09-23	2000-01-08
PWD1: 12th Ave - Woodard Creek	TC	-122.86849	47.05447	1988-03-01	2008-08-06
PWL1: Woodland Creek - TC Fairgrounds	TC	-122.78604	47.02057	1988-03-01	2008-12-31

Other Notable Attributes of 2015 and 2016 Water Years:

Frost Free Days

The number of frost free days has been increasing steadily since 1901 as indicated in the table below. The average number of frost free days has increased dramatically beginning in about 1980. Below the table are the actual frost free days as recorded at the Olympia Airport for 2015 and 2016. These numbers are specifically relevant to the Airport. Some areas within Thurston County closer to the Puget Sound have even fewer days where temperatures fall below 32°F.

Table 5: Average Number of Frost Free Days 1901 – 2016 for the Olympia Vicinity

Period of Ave	Ave # of Days above 32° F
1901 - 1930	211
1930 - 1960	213
1960 - 1980	223
1980 - 2000	234
2000 - 2010	249
2010 - 2016	263
2015	276
2016	272

*1899-1955 (National Weather Service – Priest Pont Olympia)

*1955 – Present (National Oceanic and Atmospheric Administration –Olympia Regional Airport)

Atmospheric Rivers (ARs) and Shifts in Temporal Distribution of Rainfall

Typically Thurston County experiences what is denoted as an Atmospheric River (AR) precipitation event at least once during the wet portion of the Water Year. Predictions made by climate models indicated that these events would become more severe and that there would be more of them.

This prediction has turned out not be the case, at least when viewed from single event totals. The prediction was that ARs would deliver more water than had previously been experienced in a single event. The last major AR occurred in January 2009 and delivered a definitive punch of almost a five inch rain event. A similar event occurred two years prior in 2007. However, since 2009 there has only been one daily event (November 2015) that delivered up to 3.0 inches of rain in a 24 hour period.

The data do illustrate that the rainfall pattern has dramatically shifted during WY 2015 and 2016 in that the onset of the water year in October has been abrupt and much wetter than in the past. In WY 2015 October experienced over double the average rainfall. Water Year 2016 was even more dramatic with double the average in October and also for November and December. In fact, the trend continued through March 2016 before it again abruptly dropped to less than half of the monthly average for April 2016 and continued at or below average before again raging back in WY 2017.

The total cumulative rainfall for Water Year 2016 at the Thurston County Complex in Olympia was 70.01 inches (17.7 inches above the 100-year average of 52.3 inches). In Water Year 2015 the cumulative total was 45.97

SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow, Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

inches (6.3 inches below the 100-year average). The WY 2015 and 2016 daily rainfall for every atmospheric monitoring station that the EMP maintains is presented in Appendix A

The Table below summarizes the average monthly values for the parameters indicated as recorded at the Olympia Regional Airport between January 1, 1951 and February 1, 2017.

Table 6: Climate Averages for Olympia

Climate Olympia - Washington							°C °F
	Jan	Feb	Mar	Apr	May	Jun	
Average high in °F:	46	49	54	59	65	71	
Average low in °F:	34	33	35	38	43	48	
Av. precipitation in inch:	7.83	5.28	5.28	3.54	2.32	1.77	
Days with precipitation:	-	-	-	-	-	-	
Hours of sunshine:	-	-	-	-	-	-	
Average snowfall in inch:	2	5	1	0	0	0	
	Jul	Aug	Sep	Oct	Nov	Dec	
Average high in °F:	77	78	72	60	50	44	
Average low in °F:	51	51	46	40	36	33	
Av. precipitation in inch:	0.63	0.94	1.69	4.61	8.62	7.44	
Days with precipitation:	-	-	-	-	-	-	
Hours of sunshine:	-	-	-	-	-	-	
Average snowfall in inch:	0	0	0	0	1	3	

Taken from US Climate Data.com 2017

Streamflow

General

In general, streamflows are more reactive to seasonal rainfall than groundwater or lake water levels. The streams in Thurston County rely on baseflows from groundwater and therefore do not see the rise in flows during the spring and summer months that are typical from snow pack fed streams. None of the streams that the County monitors have year-round reliance on snow melt.

The urbanized and sub urbanized basins that host the ILMA streams derive their flows from both baseflow (groundwater) and surface runoff from precipitation. The dominant component of these streams depend on the time of year. In general, small streams are fed predominantly by groundwater between June and early October. After the first significant rain events occur, generally in early to mid-October, a combination of groundwater and surface water combine to produce seasonally higher flows that persist during the wet months.

Many of the ILMA streams are in the more urbanized areas of north Thurston County and in many cases they react quite quickly to urban runoff. Streams that are located in more forested (less urbanized) areas of the County show a much lower propensity for sharp distribution curves and show a much more metered reaction to rainfall because of the buffering effects of less impervious surface.

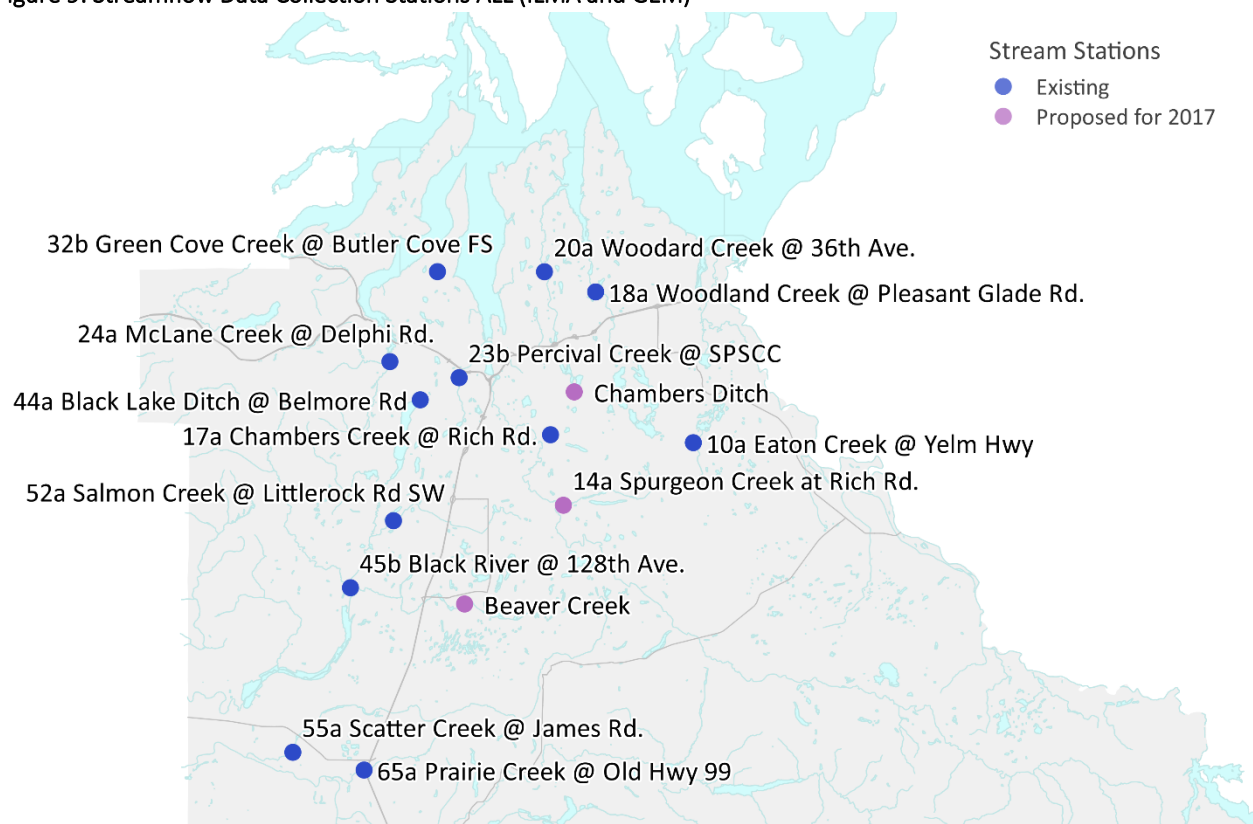
Table 7: Urban/Sub-urban Streams included in the Inter-Local Monitoring Agreement

2015 – 2018 Contributing ILMA Partners	Streamflow Station	Development level	Comments
Tumwater/Thurston County	44a - Black Ditch outlet	Sub-urban	Nearly 15 yr record
Thurston County	17a - Chambers Creek	Sub-urban	Nearly 20 yr record
Thurston County	32b - Green Cove Creek	Sub-urban	Nearly 20 yr record
Thurston County	20a - Woodard Creek	Urban	20+ yr record
Lacey/Thurston County	18a - Woodland Creek	Urban	20+ yr record
Thurston County/Olympia	23b – Percival Creek	Urban	Removed from ILMA funding 2015

Note: Table 7 includes only the streams monitored in the ILMA during the WY 2015-2016 reporting period. Percival Creek was removed from the ILMA in 2015 and was decommissioned Dec 31, 2015.

SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow, Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

Figure 9: Streamflow Data Collection Stations ALL (ILMA and GEM)



Inter-Local Monitoring Agreement Streams

The 2015 – 2018 Interlocal Monitoring Agreement contains funding for five streamflow stations listed above in the Urban Streams table S1. Percival Creek was removed for the 2015 – 2018 ILMA because it was no longer included as a funding priority by the contributing agencies. The remaining streams have been monitored almost continually since the late 1980s or early 1990s as part of the ILMA and its predecessor agreements.

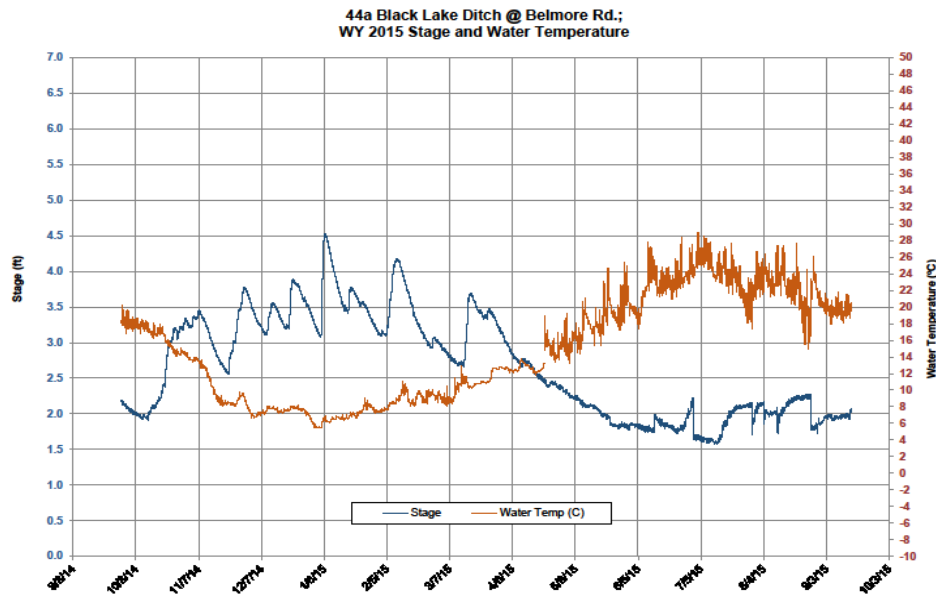
Water Year 2015 and 2016 Observations

The streamflows measured between October 1, 2014 and September 30, 2015 are predictably lower than those of average years. This period of record was dominated by severe drought conditions as described earlier in this report and by the Drought Summary Report included in Appendix A and at <http://www.co.thurston.wa.us/monitoring/precip/precip-home.html>

Below are some examples of the difference in streamflow between WY 2015 and WY 2016.

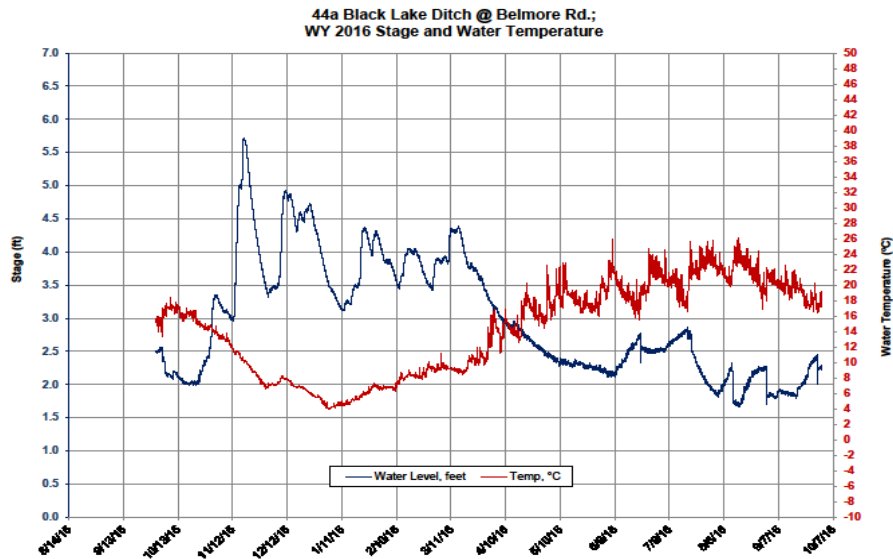
SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow, Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

Figure 10: Black Ditch Outlet (44a) - WY 2015 Stage and Temperature Data Chart



This gage was affected by beaver dams at multiple times during the year. These show up in the data plot as sudden drops in the stage in spring and summer as the dams are modified.

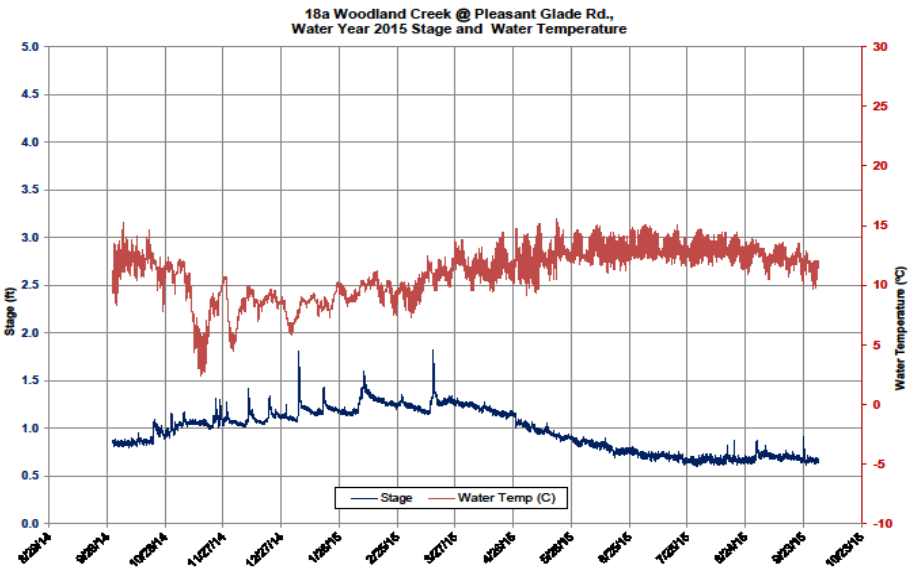
Figure 11: Black Ditch Outlet (44a) - WY 2016 Stage and Temperature Data Chart



Water Year 2016 illustrates the higher flows that were generated vs WY 2015. The beaver dam activity was also higher in 2016 than in the previous year as illustrated in the multiple successions of “buildup and breach” patterns in the summer months.

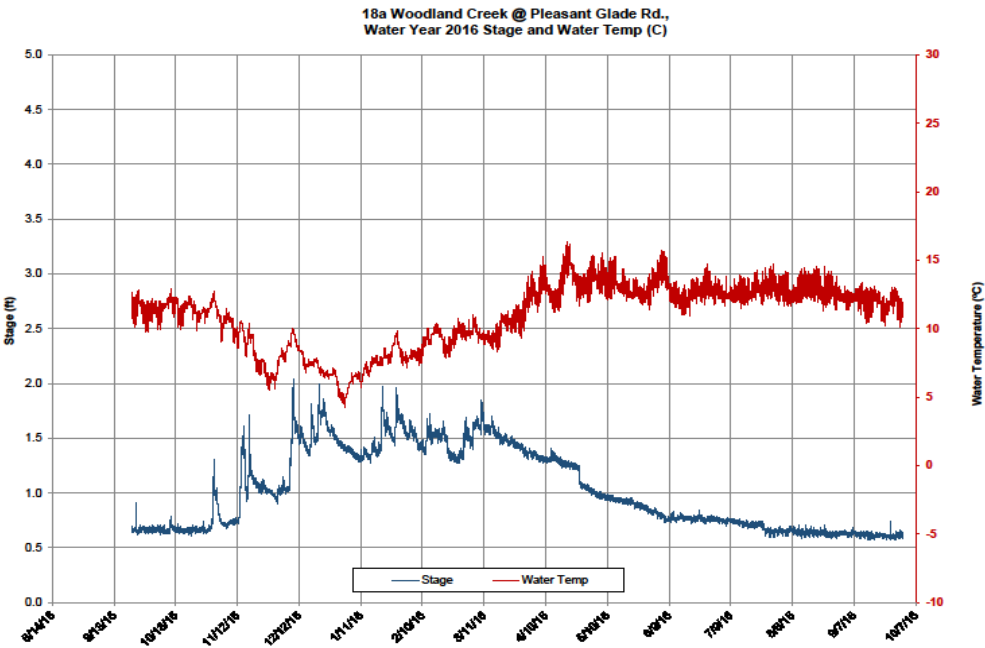
SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow, Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

Figure 12: Woodland Creek (18a) WY 2015 at Pleasant Glade Rd - Stage and Temperature Chart



These charts illustrate the differences in both the stage of Woodland Creek and the temperature of the water.

Figure 13: Woodland Creek (18a) WY 2016 at Pleasant Glade Rd - Stage and Temperature Chart



The sustained high winter flows are more characteristic of a non-drought years.

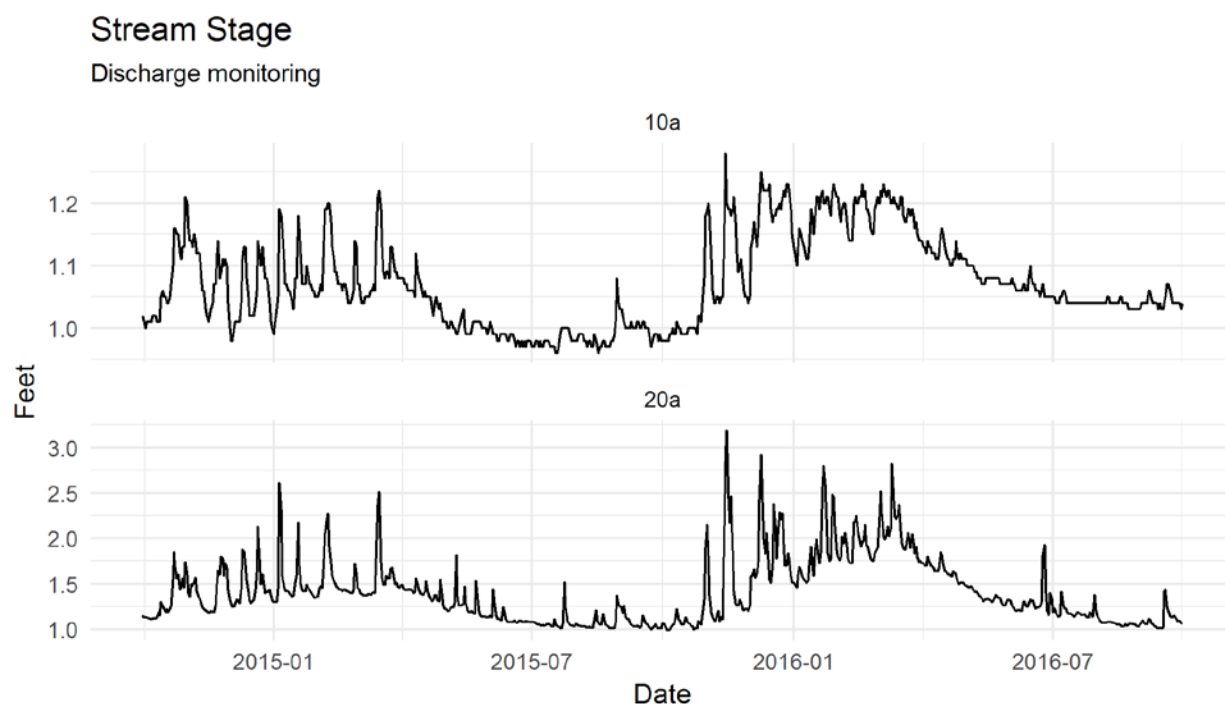
Baseflow over the winter months of WY 2016 was higher than in 2015.

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The two locations above, Black Lake Ditch at the Black Lake Belmore Road Bridge and the stream gage at Woodland Creek at Pleasant Glade Road, are indicative of the difference between the Water Year 2015 and 2016 that was repeated across the county and throughout the datasets. It is a reflection of differences in baseflow/lake level and surface water input from precipitation between the two water years.

Although these two streams are in different precipitation zones within the County (Black Ditch Basin receives 25 percent higher precipitation than the Woodland Creek Basin) and have completely different basin characteristics, the general shape and magnitude of the hydrographs is comparable and illustrate the dampening response to the 2015 drought and to individual rain events. Conversely, the higher precipitation in 2016 produced a larger baseflow bulge in the streams. This was observed throughout the datasets across Thurston County for these water years as seen in Figure 14 below.

Figure 14: Examples of Stream Stages for Water Years 2015 and 2016 in other Creeks in Thurston County – Eaton Creek (10a) flows into Lake St Clair, Woodard Creek (20a) flows to Henderson Inlet.



The Figure above is stage data from Station 10a, Eaton Creek and Station 20a, Woodard Creek, illustrate the different flow patterns between Water Years 2015 and 2016.

Rivers (flows greater than 100 cubic feet per second on average)

The larger rivers observed or recorded by Thurston County include: The Deschutes River, the Black River, the Skookumchuck River, the Chehalis River, and the Nisqually River. These rivers generally have flows over the threshold that is safe for our field staff to monitor and therefore we report streamflow data from the U.S. Geological Service. The Black River at Littlerock is the only exception to this case and is actively waded by field staff depending on upper flow volumes.

SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow, Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

The Nisqually and Chehalis Rivers define the eastern and Southwestern borders of the County respectively. Of these, the Nisqually River is the only one that has a consistent year round input from high Cascade Mountain snowpack and therefore reflects snowmelt in its baseflow, especially in the summer months. The Chehalis River and its tributaries (mainly the Skookumchuck River) have generally low to medium elevation sources and therefore groundwater or lake contributions are the primary baseflow constituents.

The larger streams and rivers also responded noticeably to the drought of 2015 characterized by dramatically lower summer flows. Also like their smaller counterparts, the effect of the 2015 drought was quick to disappear at the start of the 2016 Water Year and the return of cool temperatures and well above average precipitation in October 2015. The 2015 drought documented and discussed in the Special Attachment Report “2015 Summary of Drought Conditions for Thurston County, Washington” in Appendix A.

Water Temperature

The stream temperature is also included in the representative charts above. The difference in the magnitude and range of temperature between WY 2015 and WY 2016 in the Black Lake Ditch example is notable. WY 2015 water temperature peak at this location was 30 degree Celsius. In 2016 the peak temperature was 26 Degrees Celsius and peaked in early June rather than later in the summer as is typically the case. This is directly indicative of the atmospheric temperature and direct sun exposure on a black water body affecting upper portion of the water column, which in turn drains directly into Black Lake Ditch.

Woodland Creek did not show any appreciable difference in temperature between Water Year 2015 and Water Year 2016, even though atmospheric temperatures were near record levels in July 2015. Woodland Creek derives most of its summer baseflow volume from groundwater and has a relatively enclosed canopy throughout much of its length. This keeps its temperature relatively stable regardless of extreme temperature events at the surface.

All streamflow data are presented in Appendix B and at <http://www.co.thurston.wa.us/monitoring/flow/flow-home.html>

Groundwater

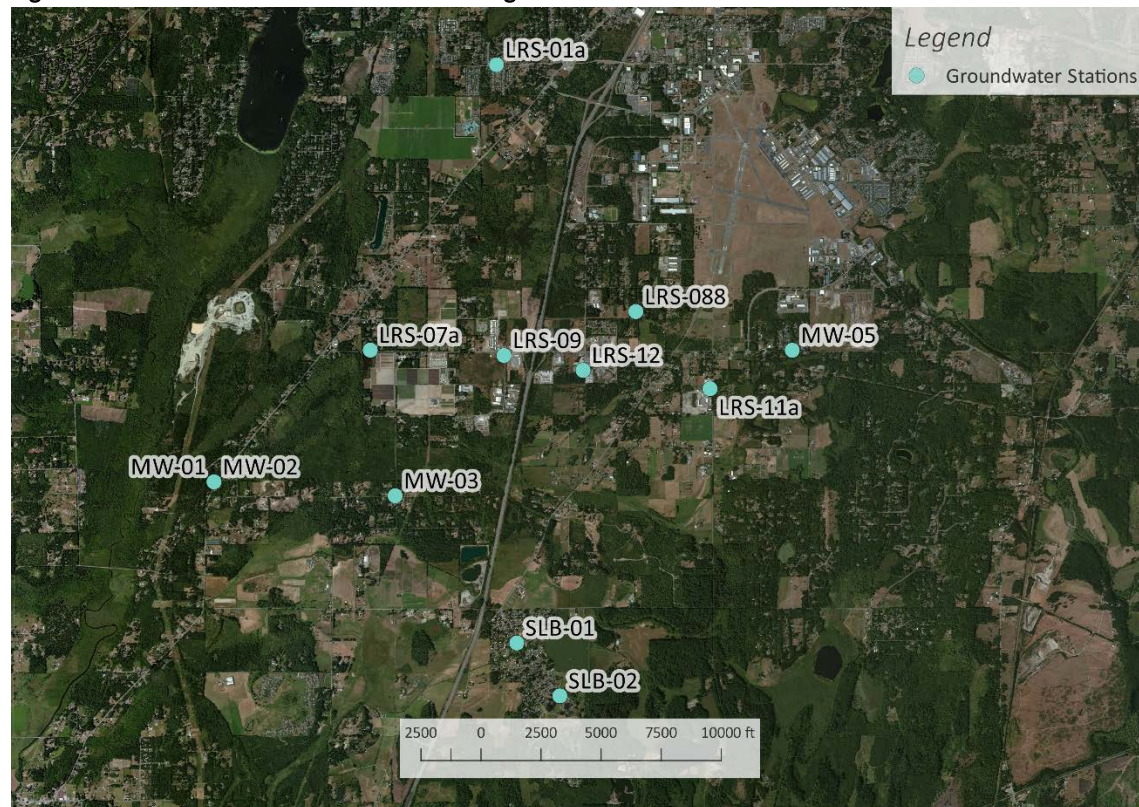
General

Although there are no groundwater wells included within the ILMA, groundwater observations and data were included in this report to provide a more comprehensive data product. Groundwater is an important driver of many surface water systems, including streams and lakes and, therefore, it has value in providing an overall picture of our water cycle.

The majority of Thurston County groundwater monitoring wells are located south of Tumwater in the Salmon Creek Basin. This area is affected by high groundwater throughout the winter months in most years. There are some areas within the basin that experience flooding annually and approximately every twenty years or so there is an increased risk of the groundwater flooding basin wide. This recurrence interval has been noted as occurring since the early 1900s in historical documents. It is of course directly reliant on precipitation and as such it may or may not actually occur exactly on a twenty year cycle.

The last widespread flood event occurred in March of 2009. The flood of record by which the Salmon Creek Basin Plan was implemented was based on a major flood event that occurred only ten years earlier in March 1999. Building requirements and general development within the Basin was modified in response to the 1999 flood. The groundwater data collected by Thurston County is used to calculate flood elevations on prospective parcels in relation to the 1999 flood elevations recorded at the indicator well locations. Below is a current map of the location of the groundwater wells in the Salmon Creek Basin

Figure 15: Location of Groundwater Monitoring Wells in the Salmon Creek Basin



SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow, Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

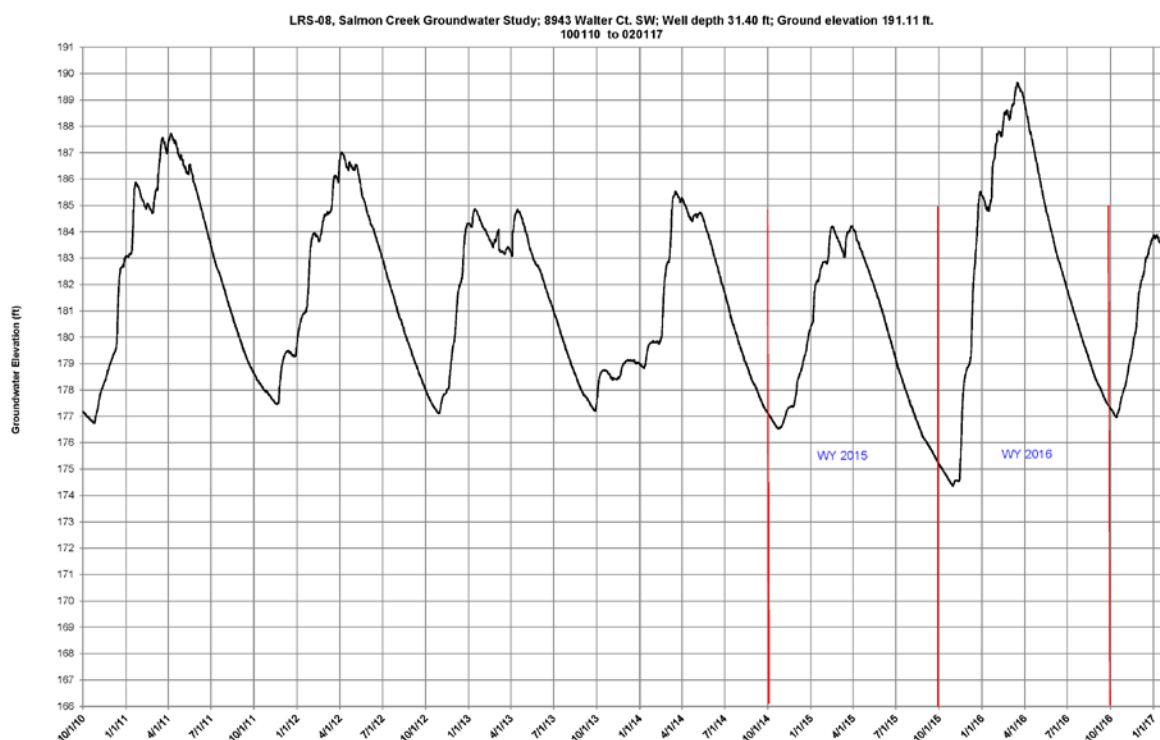
There are several other areas in Thurston County where groundwater is monitored but these are typically for project specific sites and are of durations of ten years or less.

Groundwater Levels for the 2015 -2016 Water Years (Salmon Creek Basin)

Like other segments of the water cycle, the Water Year 2015 groundwater data indicates a predictable drop in groundwater elevation during the drought of 2015. This is seen across the board in the data obtained from the ten wells in the basin. In fact, on October 4, 2014, four days into the 2015 Water Year, the groundwater elevation in the Salmon Creek Basin wells were the lowest in ten years. This was fortunate because the groundwater levels increased rapidly soon after and increased to some of the highest levels in a decade.

Had it not been for the deficit in the aquifer afforded by the 2015 drought there would likely have been flooding by January 2016. By March 20, 2016 the groundwater had risen fifteen feet from its low point and was visible at the surface in some low lying areas. The peak elevation of the groundwater measured at LRS-08 located at 8943 Walter Court SW was 189.5 ft. At the same time in March of 2015, the water elevation was 184.2 ft., 5.3 feet lower than it was in 2016. Figure 16 below is a graph of this well data.

Figure 16: Groundwater well elevation data from LRS-08, Walter Court SW

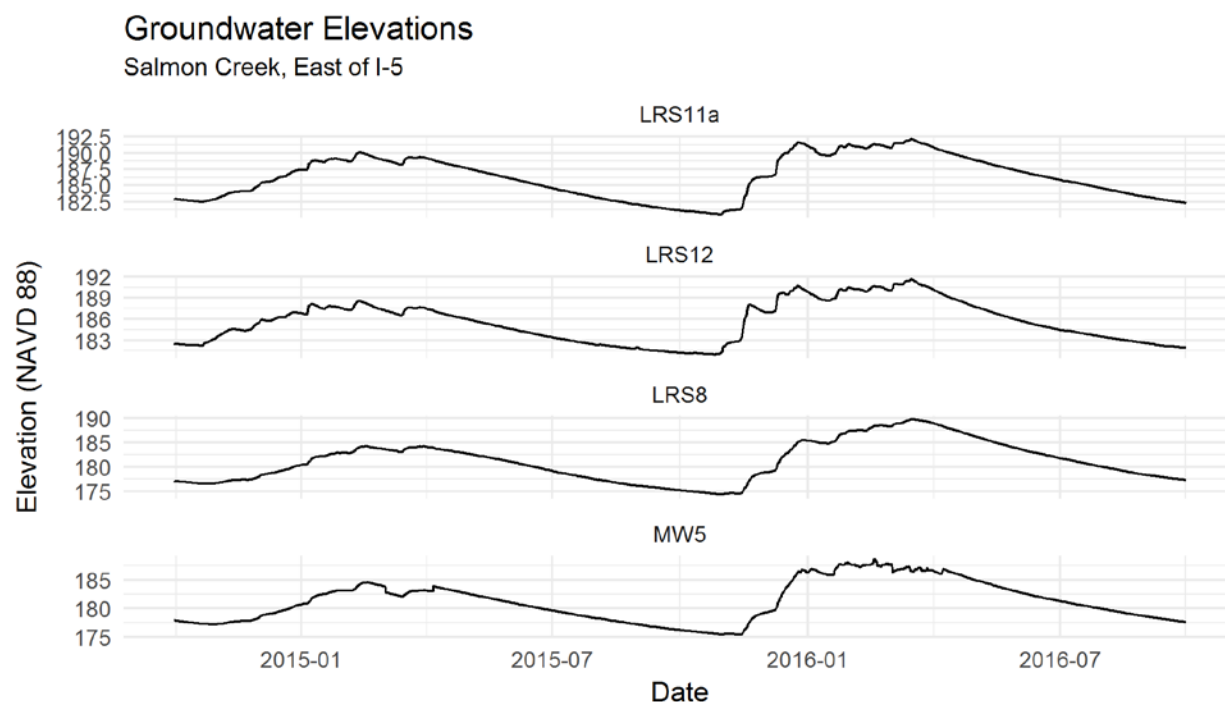


The groundwater monitoring well shown above is located in the middle of the Salmon Creek Basin and is the primary indicator well for overall conditions within the shallow aquifer. It is used to indicate the probability of high groundwater hazards including potential for surface flooding caused by excessive groundwater expressing at the surface. For reference, groundwater breached the surface at this location in 1999 almost three feet above

SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow, Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

the surface creating widespread flooding throughout the basin. LRS-08 is a primary index well that is used for the eastern half of the basin between Interstate 5 and Brooks Ln SE.

Figure 17: Groundwater Elevations for the Eastern Basin Groundwater Monitoring Wells (Interstate 5 to Brooks Ln SE)



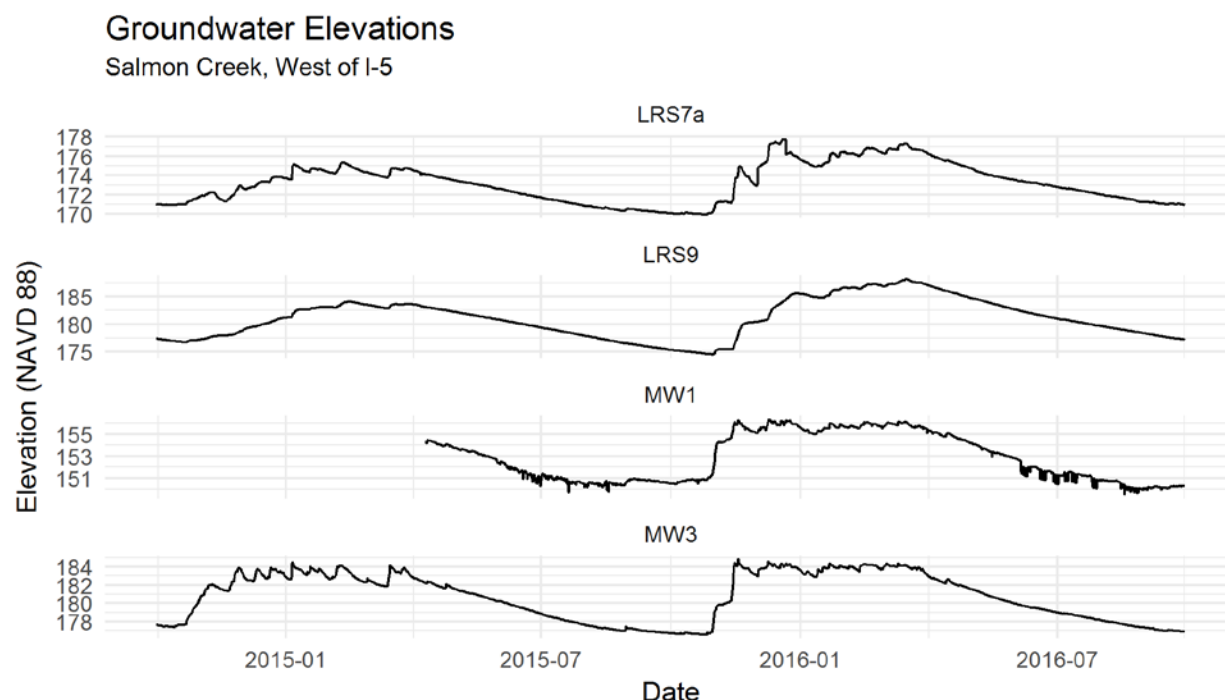
Note the dampened groundwater bulge during the dry winter months and drought in the summer of 2015 creating very low groundwater elevations. The end of the drought is marked by the rapid increase in groundwater at the beginning of the 2016 Water Year

The groundwater elevation in the western portion of the Salmon Creek Basin is markedly different than in the eastern half of the basin. The dividing line between the east and west portions is Interstate 5, which runs roughly through the middle of the basin. The principle differences between the two halves of the basin are: 1.) Groundwater is shallower in the West Basin and 2.) Groundwater is more reactive and rises quicker in the west basin than it does in the east basin.

The underlying cause of this difference is in the geology that controls the upper, unconfined aquifer responsible for surface flooding. The confining material is a till layer that lies beneath a medium sand. The aquifer responsible for flooding in the basin is the medium sand as it fills during the wet season. The sand above the till thins to the west causing the groundwater to breach the surface quicker because it has less overburden in which to reside. This is why flooding is generally more severe west of I-5 and typically occurs earlier in the wet season. In addition, the overall groundwater gradient flows west toward the Black River ancestral channel. There is a debate as to the role Interstate 5 may play in impeding flow across the entire basin by interrupting the flow path both at the surface and extending below its compaction prism.

SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow, Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

Figure 18: Groundwater Elevations for the Western Basin (Interstate 5 to Littlerock Road)



The western basin shows a similar pattern of groundwater elevation changes as the eastern basin. Wells in this part of the basin generally react more rapidly to high and low precipitation seasons as seen by a jagged pattern in the charts. This is due to the direct interaction with precipitation infiltrating into the shallower sand in the western basin.

The Salmon Creek Basin is not the only location where groundwater is monitored by Thurston County. It is the most extensive and has the longest, continuous record of groundwater data in the County. Other locations throughout Thurston County where groundwater data is recorded include: Tanglewilde in Lacey, Hidden Forest subdivision also in Lacey, Scott Lake south of Tumwater, and some smaller sites for project-specific groundwater data requirements. In 2017, a proposal to install eight deep groundwater monitoring wells in Scatter Creek aquifer in Southern Thurston County has been approved and will be implemented by summer 2017.

The Salmon Creek Basin groundwater data is attached in Appendix C of this report. Data is also available online at <http://www.co.thurston.wa.us/monitoring/ground/ground-home.html>

Lakes – Lake St. Clair, Long Lake and Black Lake

Overview

Thurston County Water Resources began collecting lake levels for three major lakes in Thurston County beginning in 2011. The three lakes are:

- 1.) Lake St Clair in North Eastern Thurston County between Yelm and Lacey
- 2.) Long Lake in North Central Thurston County
- 3.) Black Lake in North Western Thurston County

Although there are dozens of lakes in the County, these lakes were prioritized because they were the most densely populated, and because they are entirely or predominantly within the County jurisdiction. Black Lake and Long Lake share boundaries with Tumwater and Lacey respectively. Lake Level data is also available in Appendix D, and online at <http://www.co.thurston.wa.us/waterresources/lakes/lakes-st-clair.html>

Each lake listed above has a separate web page for level data.

There is also a Lakes Home Page maintained by Thurston County Public Works which oversees the County Lakes Program at http://www.co.thurston.wa.us/tcweeds/lakes/lakes-home_nw.html

Observations

In general water levels in all Thurston County lakes have been higher than average over the past several years. Water levels during the 2015 and 2016 Water Years have been some of the highest lake elevations in a decade. Although the exact cause of this is not completely understood, it is not simply because there has been an increase in rainfall. In fact, only one of the two water years (2016 at 70 inches of rain) was above average. Water Year 2015 had a total of only 46 inches of precipitation which is about six inches below the average. Predictably, water levels were higher in 2016 than they were in 2015. Lake levels were still above average in 2015 (one of the hottest driest on record) indicating that some other mechanism is affecting water levels beyond merely total precipitation. Therefore, we cannot use total yearly precipitation as a definitive gage for all lake level anomalies. Groundwater is a major factor that affects lake levels regardless of rainfall. Successive years of high groundwater can negate single water year precipitation anomalies, either high or low.

In fact, even the 2015 drought, which was listed as Severe by the National Weather Service, did not ebb the high lake levels in Lake St. Clair. By the end of Water Year 2016 (Sept 30, 2016) the Lake was already at or slightly above the five mile per hour boating speed restriction elevation as set by County ordinance, of 69.5'. The summer of 2016 had the shortest period of time without a speed restriction since records were available, starting in 1988.

The 2015 drought was noticeable in Long Lake and pronounced in Black Lake by the end of 2015. The deficits were rapidly erased as the rains returned at the beginning of Water Year 2016 in all three lakes.

Lake St Clair

Lake St Clair is a unique case in Thurston County and the following section is devoted to it. We cannot explain or solve any claims conclusively in this report and do not attempt to do so, however some general findings are presented in the sections below

SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow, Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

Lake St Clair is an isolated kettle lake left over from the continental ice sheet that occupied this region 13,000 years ago, it by definition has no natural surface outlet. We have attempted to identify artificial outlets rumored to have been installed by the Washington Department of Transportation as part of a drainage feature when Highway 510 was constructed. We were not successful in identifying any records to support this claim after inquiring from the Department of Transportation.

Other factors such as evaporation cannot account for multi-foot variations that we have seen recently. The only other contributing components to lake level changes is groundwater or outlet occlusion.

This means that groundwater seepage is the only dominant outlet for draining Lake St Clair. The system has been studied intensively over the last two decades and there is very strong support that Lake St Clair is part of an enormous groundwater conductance system that flows from the Southeast *and* Southwest. Lake St Clair is positioned at the intersection of these two flow arms. The estimates of the amount of groundwater that flows beneath the lake are as high as hundreds of millions of gallons per day during peak flows.

A significant portion of this groundwater daylights at the McAllister springs located northwest of the Lake. These natural springs flow freely from a highly conductive gravel wedge that extends well up gradient of Lake St Clair. This gravel wedge is highly conducive to groundwater flow and is the most probable mode of groundwater transport to the McAllister Springs. There are other highly conductive lenses at much deeper levels below the lake that also contribute to the transport of groundwater; these account for the remaining modes of hydraulic transport to the Puget Sound. Much of the fresh water output into the Sound is below sea level.

The McAllister Wellfield

There has been speculation that since the City of Olympia changed its primary drinking water source from the McAllister Springs Basin site to a newly drilled series of deep wells, approximately one mile southeast of the springs that this influences Lake St Clair water levels. The water rights were transferred from McAllister Springs to the wellfield and no water has been pumped from the McAllister stilling basin since 2015.

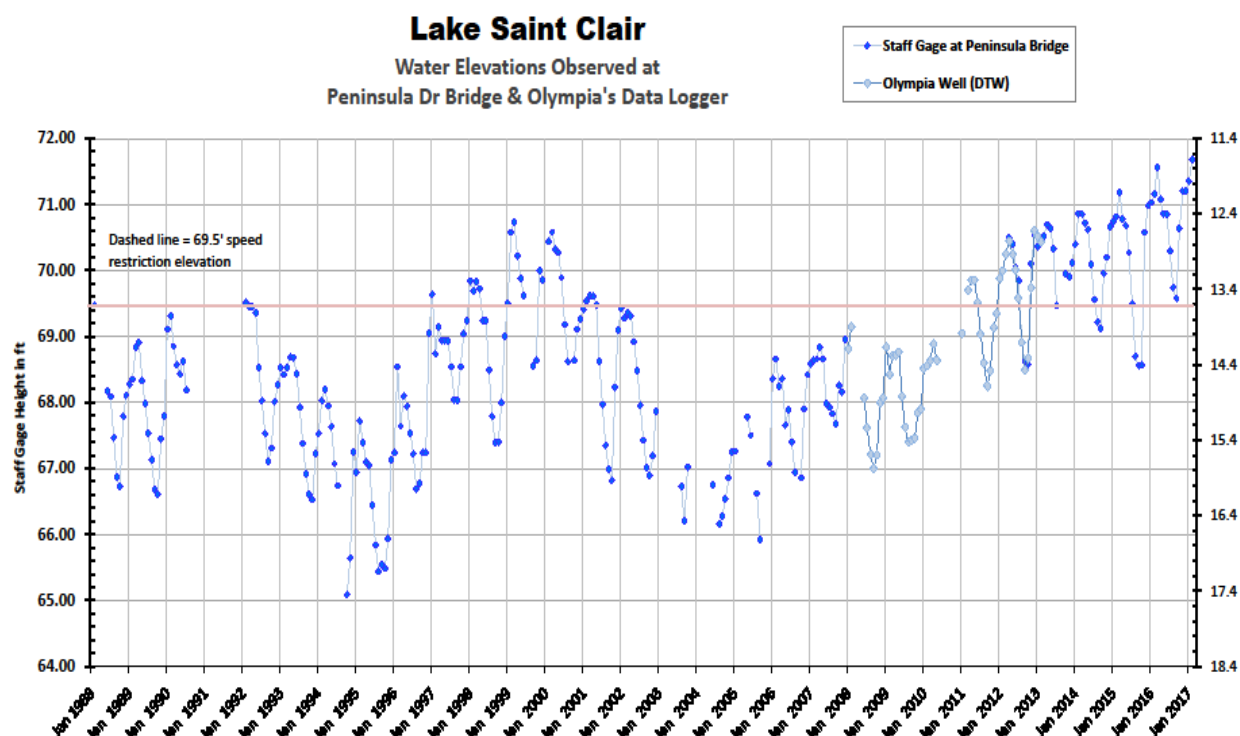
The City of Olympia began using the McAllister Wellfield beginning January 1, 2015. The levels in Lake St. Clair began rising gradually and steadily beginning in 2005, ten years prior to the production wells being turned on. The wells were not even drilled until 2009 – 2012.

The City of Olympia did not pump water from the springs directly. The water flows from the springs naturally under gravity into a stilling basin and from there it was pumped into the city water supply. There was no negative pressure head applied to the springs to hasten drainage. The water that formerly was used by the City is now free flowing into McAllister creek. Records obtained from the City of Olympia indicate that on average about 190 million gallons per month were pumped from the stilling basin and use as potable water.

Below is a chart of Lake St. Clair surface elevation data from 1988 – 2016. There are several trends visible in the data but the most pronounced is the gradual and sustained rise in the lake level beginning in 2005 and continuing up to the present day.

SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow, Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

Figure 19: Lake St. Clair Surface elevation Chart 1988 - 2016



Datum: NGVD 29' converted from MSL City of Olympia Datum

The exact cause of the steady increase is not certain but it likely includes an increase in groundwater and probably a change in surface water input from Eaton Creek and from changing precipitation patterns.

Long Lake and Black Lake did respond to the drought with significant reductions in overall lake levels. All three lakes were again similarly affected by high surface elevation issues in the wet season at the end of the 2016 Water Year but not to the extent of Lake St Clair. Long Term data charts of these three lakes are included in Appendix D. It is necessary to include the long term lake level data to illustrate divergence or similarities between past Water Years.

Long Lake

Long Lake is located in the southeastern Urban Growth Area of Lacey and is highly urbanized like most of the surrounding lakes. Long Lake is part of a three lake group that also includes Pattison Lake and Hicks Lake. These lakes are hydraulically connected by surface and subsurface flow ways. Unlike Lake St Clair, Long Lake has a well-defined outlet that constitutes the headwaters of Woodland Creek.

SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow, Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

Long Lake has also experienced higher than average seasonal lake levels during Water Years 2016 but not in 2015. The drought of 2015 affected the lake elevation more significantly than it did in nearby Lake St Clair. Although there is a significant portion of Long Lake that receives recharge from groundwater, unlike Lake St Clair, the fact that it has an outlet prevents the lake level from getting excessively high. In 2016 however the County did receive many calls from residents on Long Lake reporting high lake levels and some flooding to properties. The chart below is data collected from the Holmes Island Bridge lake elevation gage that Thurston County maintains. The chart is a compilation of data from 2011 into 2017 to illustrate the range of surface elevations that seasonally occur. The chart below shows that WY 2016 lake elevations were higher and longer duration than past water years.

Figure 20: Long Lake Surface Elevation Data 2011 – early 2017



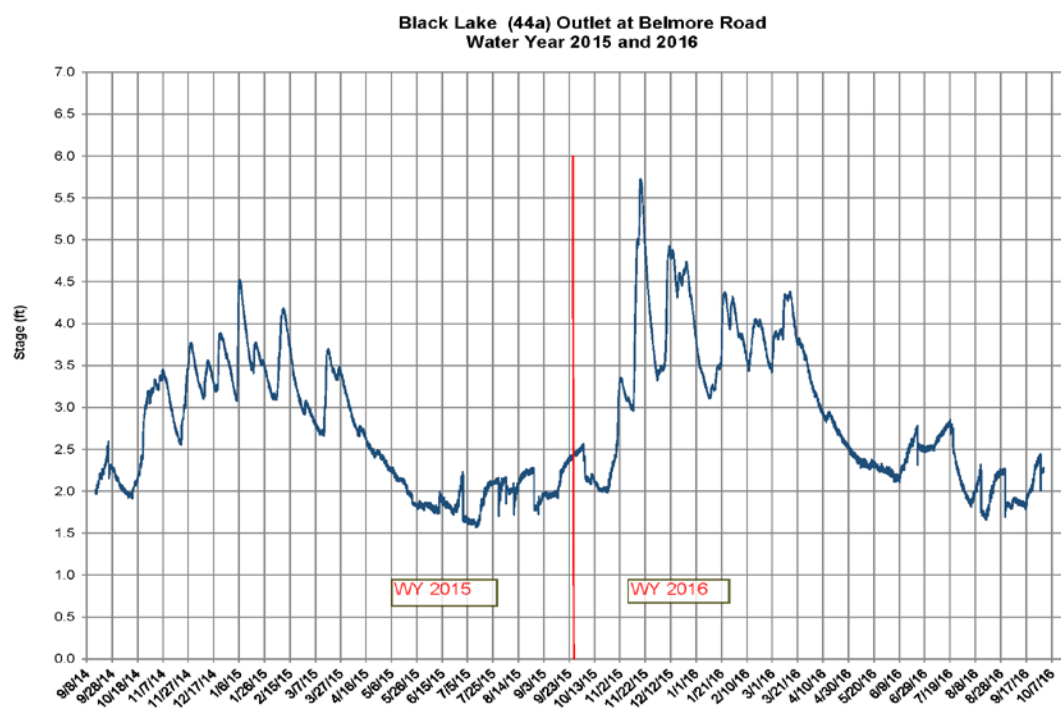
Note: The magnitude of surface elevation change is less than that of Lake St. Clair. Long lake is on the order of 2 feet, whereas Lake St Clair is on the order of 3+ feet in 2016.

Black Lake

Black Lake also responds to variations in precipitation in predictable ways. This lake, however, responds more quickly than most lakes. The Black Lake Basin is located west of Olympia, partially in the City of Tumwater. It is situated between the Black Hills and the basalt hills of Somerset Hill in Tumwater. This basin has highly impermeable rock and glacial till underlying the surface layers. In addition, the topography is steep and this basin receives approximately 25 percent higher precipitation than the Olympia airport only five miles to the east. As a result of these combinations of factors: geology topography and intensified precipitation, the lake rises and falls more like a river than a lake. The figure below is a chart of Water Years 2015 and 2016 plotted together. The 2015 drought is apparent in Water Year 2015.

SUMMARY REPORT and ANALYSIS for WATER YEARS 2015 -2016 including Atmospheric, Streamflow, Groundwater and Lake Level Data – Thurston County Environmental Monitoring Program

Figure 21: Stage Chart for Black Lake for Water Years 2015 and 2016. There is a noticeable difference in the lake level between the two years in magnitude, shape, and duration of the distribution curve. The repeated peaks and drops of the level in the summer months is due to very active beaver dam construction and removal from the Black Ditch Outlet.



Summary of Water Year 2015 and 2016

Water Year 2015 was anomalously drier and warmer than average. It ranks as the warmest and most persistently dry year in the 120 year period of record for Western Washington. The warm and dry weather was a continuation of the 2014 trend - 2014 was the second warmest year on record. The back to back warm and dry atmospheric conditions spawned a severe drought in Western Washington and throughout the western U.S. In Thurston County the Water Year 2015 drought created very low surface and groundwater levels (with the exception of Lake St. Clair). Record low humidity and high temperatures desiccated the surface causing severe stress to vegetation used to cool and humid evenings. We ended the 2015 Water Year with 42 inches of rain – approximately ten inches below normal – and with several broken records for high temperature and low humidity.

The trend of the previous Water Years did not continue in 2016. The spring began very warm but soon turned cooler than average by mid-June 2016. The remaining months of the summer were on average ten degrees cooler than normal and approximately 25 percent wetter than average. This weather pattern occurred during the strongest El Niño ever recorded. It did not follow the computer model projections of a continuing warm and dry period for the Western United States; in fact, the opposite occurred, and by the end of the 2016 Water Year (September 2016) we had received 62 inches of rain.

The effect on surface water was predictable. In 2015 there were some low flow records broken for the Deschutes River and some other local streams as a result of the drought. This deficit was erased by November 2015 and minor flooding was recorded in December in some streams. In addition to the minor flooding on streams, Lake St Clair remained high throughout the summer of 2015 despite the drought. It also remained high through Water Year 2016, allowing only a few days of recreational boating at speeds above five miles per hour. This was the shortest recreational boating season on record since a speed restriction ordinance was adopted.

Closing

Thurston County Water Resources, Environmental Monitoring Program has continued to collect data for our Regional Interlocal Monitoring partners and our General Environmental Monitoring program for almost twenty years. Together with the Thurston County Environmental Health Division we collect millions of data points per year for processing and modelling. All of the data collected by our programs is available electronically at no cost to the public and other government agencies at the websites listed below. We strive to make data as accurate as possible and to analyze as much data as possible with our internal staff for detailed quantity modeling and statistical analysis. The program is continuing to evolve with new technologies and analytical techniques. We will be striving to provide the highest quality data for quantifying our local water cycle and integrating it with our regional partners. We will be continuing to improve our data quality and services with new locations and using remote sensing technologies in the upcoming years. We will be providing additional services for quantification of drinking water aquifers as well as surface water flows and atmospheric monitoring. The water cycle begins in the clouds and ends in the Puget Sound or Pacific Ocean, and we attempt to quantify it at every level from the raindrops, streams, ground and lakes until it returns to its source.

**List of Monitoring Locations
and Their Basin Code Designations
04/30/17**

Precip - Atmospheric

05u_Yelm WRF
10u_Meridian Rd
11u_NOAA
11w_Rainier DB
13u_Lk Lawrence
18u_Lacey FD3 FS
18w_WARC
20u_South Bay FS
23u_Bldg 4
24u_McLane FS
27u_Boston Harbor
33w_Griffin FS
45u_Littlerock 128th Ave
45w_Rochester DB
55u_Tenino
59u_Bloody Run_USGS
60u_Bucoda_USGS
65u_Grand Mound
69u_Summit Lk

Stream and Lake

10a Eaton Ck Basin
10b Lake St Clair
14a Spurgeon Creek
17a Chambers Ck_Deschutes Rvr Basin
17b_Chambers Ditch Wilderness
18a Woodland Ck Basin
18b Long Lake
20a Woodard Ck Basin
23b Percival Ck Basin
24a Mclane Ck Basin
32b Green Cove Basin
44a Black Lk Dit Outlet
45b Black Rvr @ 128th Ave SW
52a Salmon Ck
53a Scott Lake
54a_Beaver Ck
55a Scatter Ck
65a Prairie Ck

Groundwater

LRS07a_Rw Dat
LRS08_Rw Dat
LRS09_Rw Dat
LRS11a_Rw Dat
LRS12_Rw Dat
MW01_Rw Dat
MW03a_Rw Dat
MW05_Rw Dat

Appendix A

APPENDIX A – Precipitation and Climate Data

This Appendix contains daily precipitation values for all active stations during Water Years 2015 and 2016. There are a total of 19 (nineteen) precipitation recording stations that are part of the Inter-Local Monitoring Agreement (ILMA) and the General Environmental Monitoring (GEM) program. The stations are located throughout Thurston County and provide detailed records of not only precipitation but also temperature, barometric pressure wind speed and direction and solar radiation in some locations. There are two stations, one at Building 4 of the Thurston County Courthouse Complex in Olympia, and another site at the Thurston County Emergency Operations Center on Tilley Road SE, that provide users with live access via the internet. The ILMA stations are indicated by blue color coding and by “ILMA” designation.

All precipitation/atmospheric data stations collect data at fifteen-minute intervals. This detailed data is not presented in this report because of space constraints but it is available at [www.thurstoncountywa.gov](#) along with all other data presented in this report. Thurston County maintains all current and historic data for each station listed in Appendix A – D.

This Appendix also contains other general information that pertains Thurston County’s Precipitation and Atmospheric Data Monitoring portion of the Environmental Monitoring Program. The information is intended to augment the Water Year report and contains interesting facts and analysis that readers may find valuable.

◆ Map of Precipitation and Atmospheric Monitoring Sites

Data Tables for the following Precipitation and Atmospheric Monitoring Stations:

GEM Program Sites as of Sept 30, 2016

- **Yelm (05u)** – Middle Nisqually River and East County
- **Meridian Road SE (10u)** – Lake St Clair
- **National Oceanic and Atmospheric Administration (NOAA -11u)** – North Central and Calibration Control Site
- **Rainier (11w)** – Middle Deschutes River
- **Lake Lawrence (13u)** – Upper Deschutes River
- **WARC_T.C. Waste and Recovery Center (18w)** – Nisqually River Mouth and Northeast County
- **McLane Fire station (24u)** – McLane Creek and West Olympia
- **Boston Harbor (27u)** – Boston Harbor and northeast Peninsulas
- **Griffin Fire station (33w)** – Sunrise Beach and Southwest Eld Inlet
- **Littlerock at 128th Ave SW (45u)** – Middle Black River and Salmon Creek Basin
- **Rochester (45w)** – South Black River and West Scatter Creek Basin
- **Tenino (55u)** – Upper Scatter Creek and middle Skookumchuck River
- **Skookumchuck Dam at Bloody Run (59u USGS)** – Skookumchuck Reservoir and upper Skookumchuck River
- **Bucoda (60u USGS)** –Lower Skookumchuck River
- **Grand Mound (65u)** – Lower Scatter Creek, Black River and Chehalis River Confluence
- **Summit Lake (69u)** – Northern Black Hills and Summit Lake drainages

Summary Report and Analysis of Water Years 2015 – 2016 including: Atmospheric, Streamflow, Groundwater and Lake Level Data –Thurston County Environmental Monitoring Program

ILMA Sites as of Sept 30, 2016

- **Lacey Fire Station # 3 (ILMA 18u)** - Middle Woodland Creek
- **Southbay Lacey Fire station (ILMA 20u)** – Woodard Creek
- **T.C. Building 4 Olympia (ILMA 23u)** – Percival Creek (removed from ILMA after WY 2016) and Calibration Control Site

The additional information in this Appendix includes:

- **Precipitation Gage period of Record**
- **Annual Rainfall Chart for WY 2015 and 2016**
- **2015 Drought for Thurston County and Western Washington Report (2015)**
- **1960-2015 Long Term Precipitation Records from the NOAA Olympia Airport site**
- **Science Behind Atmospheric Rivers (Graphic from NOAA)**

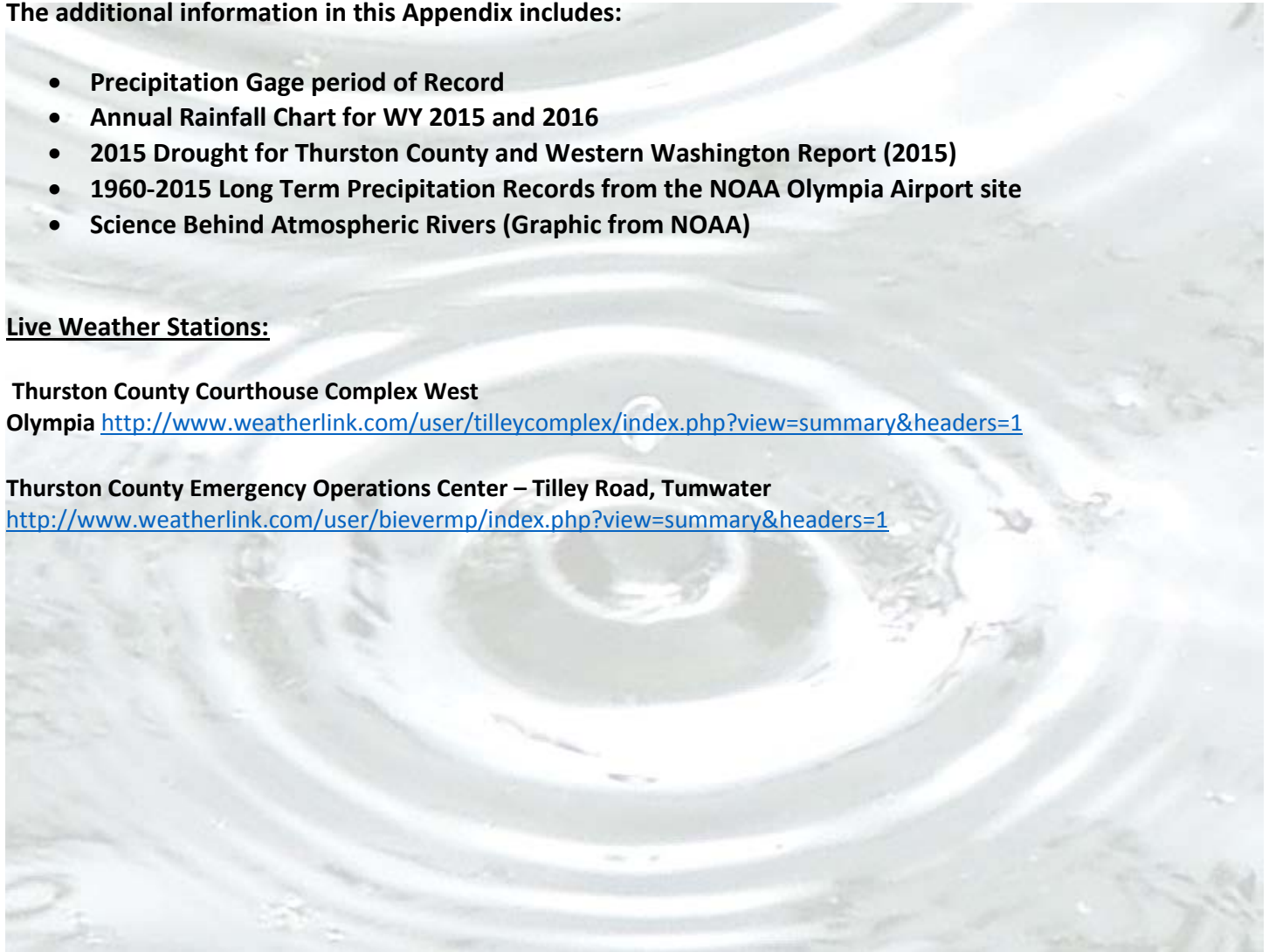
Live Weather Stations:

Thurston County Courthouse Complex West

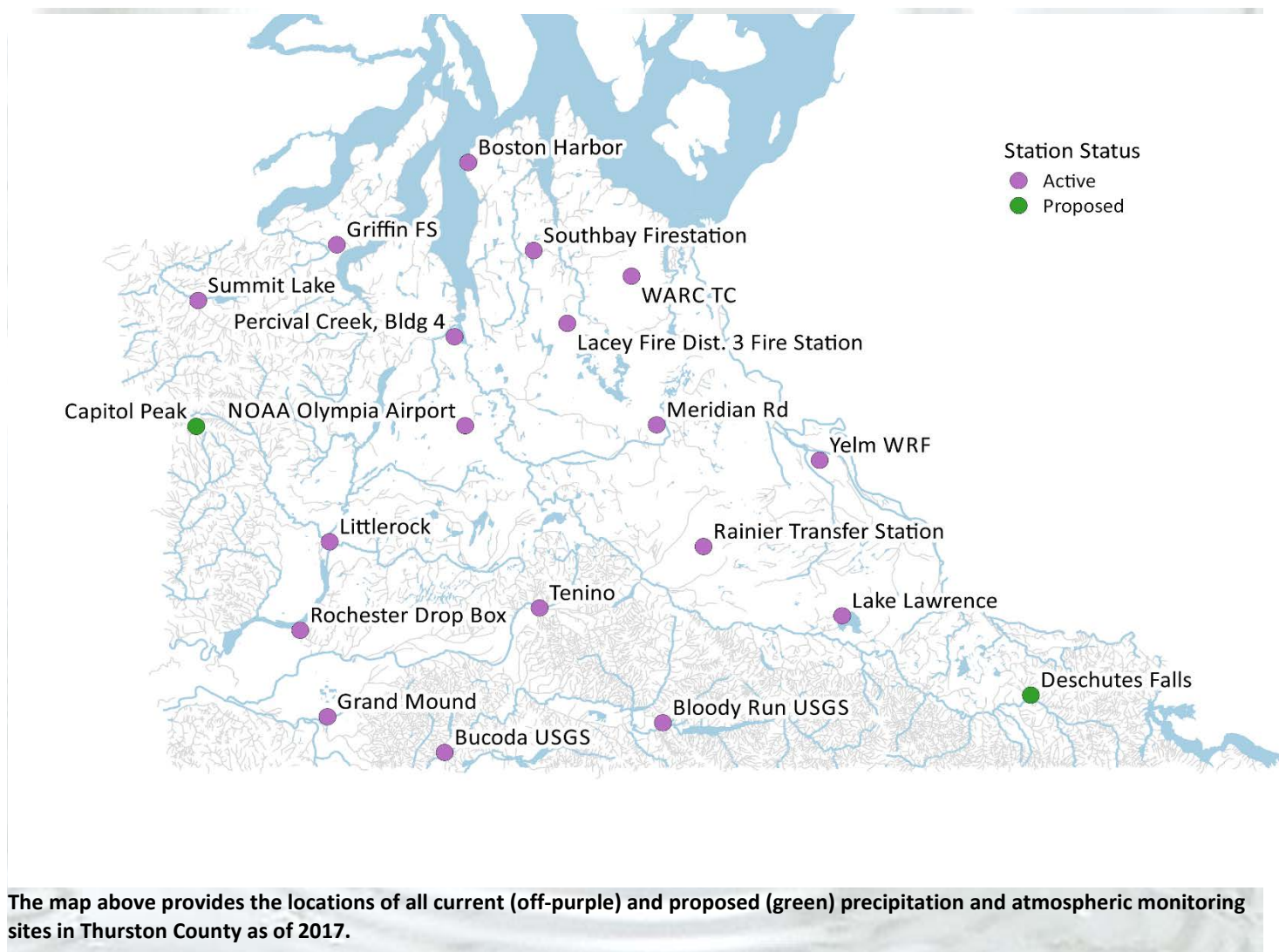
Olympia <http://www.weatherlink.com/user/tilleycomplex/index.php?view=summary&headers=1>

Thurston County Emergency Operations Center – Tilley Road, Tumwater

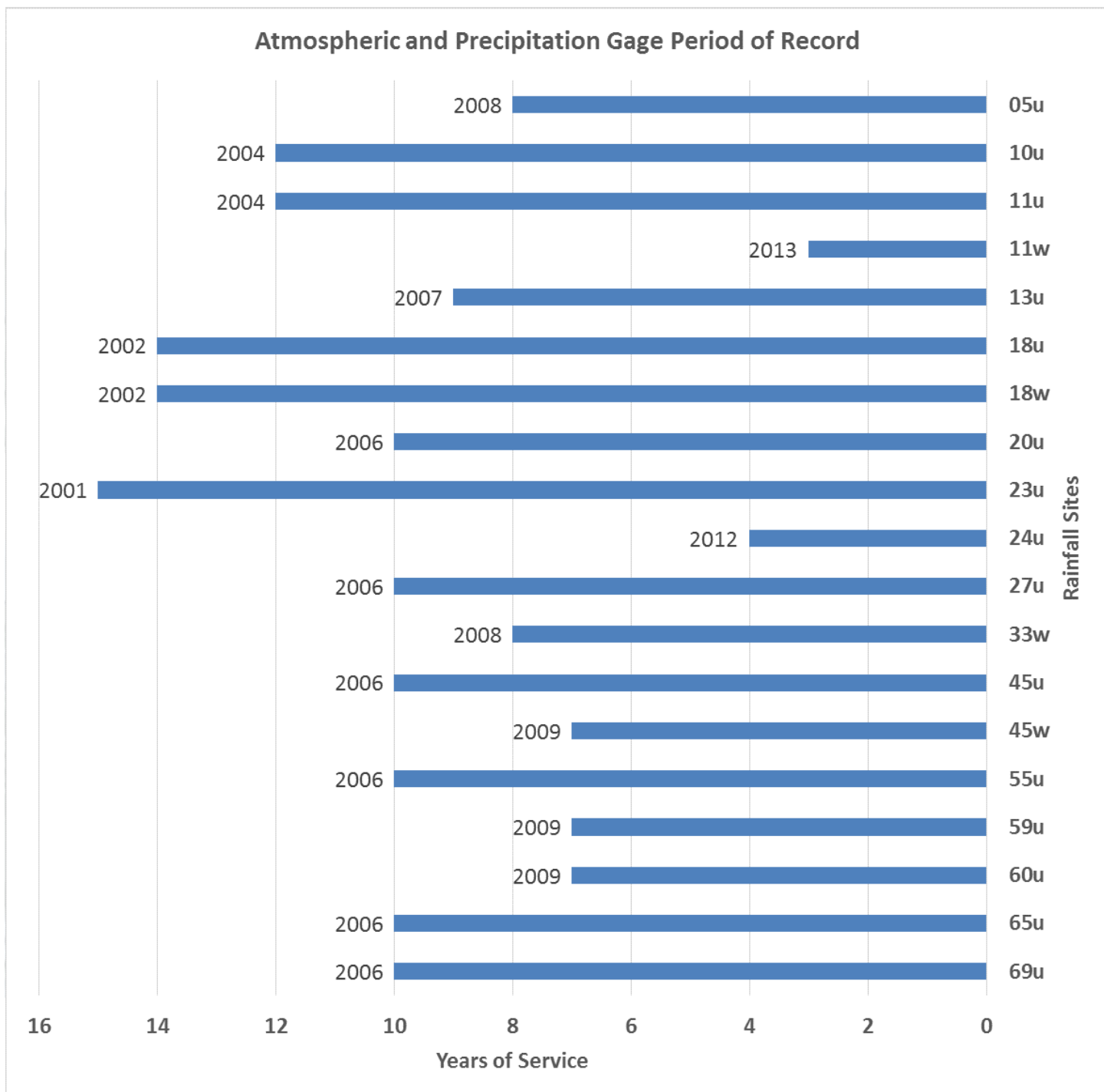
<http://www.weatherlink.com/user/bievermp/index.php?view=summary&headers=1>



Map of Precipitation and Atmospheric Monitoring Sites in Thurston County



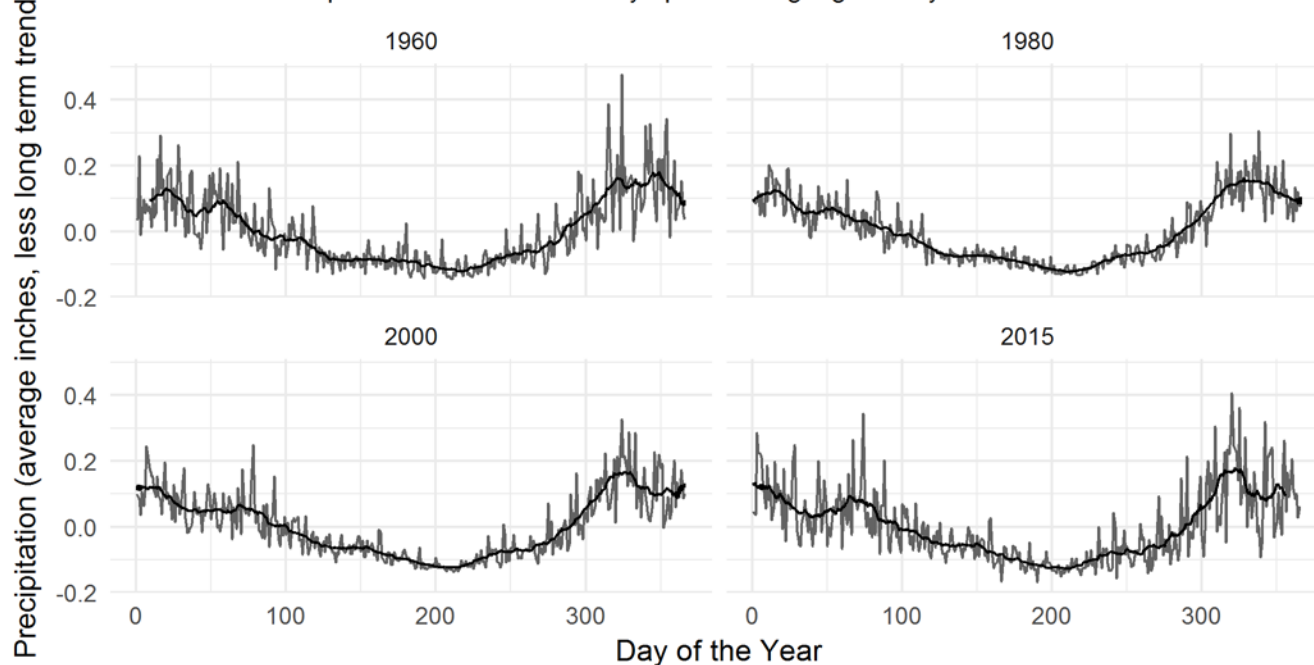
Precipitation Gage Period of Record Chart



The graphic above shows the number of years that each precipitation monitoring site has been in service. The period of service is used to determine the annual average rainfall for each station. The data is collected at 15-minute intervals over the entire period of record at each site.

Seasonal Precipitation at Olympia Airport

The seasonal component of rainfall at the Olympia NOAA gauge for 4 years



This graphic illustrates changes in the precipitation patterns for selected historical data from 1960, 1980, 2000, and 2015. The 2015 distribution of precipitation is similar to that of 1960. It is common to refer to the current condition as “never happened before” when if the data is reviewed for a long period of history similar patterns are present and have occurred before. It is possible that the current rainfall pattern is a recurring pattern that is repeating on a somewhat regular pattern.

Climate change is difficult to identify and quantify through precipitation records alone for our area. The precipitation patterns in Western Washington are highly variable and have no long term trends easily identifiable—even over the past 100 years. The actual signature of climate change for our region may not be in the amount of rainfall, but maybe in the temporal distribution of it and other signatures such as seasonal temperature trends. We shall see in the data what trends appear and if they are statistically substantial and significant over a sustained period of record. The obvious problem is how long is that identifiable period of record when dealing with phenomena such as climate that may cycle over thousands of years.

DATA TABLES



05u--Yelm WRF_Rain

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.00	0.00	0.00	0.12	0.00	0.46	0.00	0.06 e	0.00	0.00	0.13
02	0.00	0.13	0.00	0.01	0.17	0.01	0.01	0.00	0.08 e	0.00	0.00	0.00
03	0.00	0.16	0.00	0.00	0.00	0.00	0.05	0.00	0.00 e	0.00	0.00	0.07
04	0.00	0.07	0.01	1.23	0.38	0.00	0.00	0.00	0.00 e	0.00	0.00	0.00
05	0.00	0.18	0.13	0.69	0.53	0.00	0.00	0.37	0.00 e	0.00	0.00	0.00
06	0.00	0.51	0.10	0.00	0.46	0.00	0.02	0.00	0.00 e	0.00	0.00	0.09
07	0.00	0.00	0.00	0.01	0.84	0.00	0.10	0.00	0.00 e	0.00	0.00	0.00
08	0.00	0.00	0.13	0.00	0.14	0.00	0.80	0.00	0.00 e	0.00	0.00	0.00
09	0.00	0.17	0.40	0.00	0.14	0.00	0.00	0.00	0.00 e	0.00	0.00	0.00
10	0.04	0.00	0.57	0.10	0.06	0.00	0.40	0.00	0.00	0.00	0.08	0.00
11	0.13	0.01	0.15	0.09	0.00	0.07	0.20	0.02 e	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.20 e	0.00	0.00	0.00	0.00
13	0.30	0.00	0.00	0.00	0.01	0.07	0.15	0.17 e	0.00	0.00	0.00	0.00
14	0.29	0.00	0.00	0.00	0.00	1.08	0.05	0.01 e	0.00	0.00	0.19	0.00
15	0.21	0.00	0.00	0.15	0.00	1.75	0.00	0.00 e	0.00	0.00	0.00	0.00
16	0.00	0.00	0.05	0.01	0.00	0.05	0.00	0.00 e	0.00	0.00	0.00	0.07
17	0.02	0.00	0.14	1.08	0.00	0.07	0.00	0.00 e	0.00	0.00	0.00	0.18
18	0.01	0.00	0.21	0.28	0.00	0.00	0.00	0.00 e	0.00	0.00	0.00	0.00
19	0.00	0.02	0.04	0.05	0.04	0.00	0.00	0.00 e	0.00	0.00	0.00	0.00
20	0.18	0.01	0.83	0.00	0.00	0.03	0.00	0.00 e	0.00	0.00	0.00	0.00
21	0.01	0.24	0.25	0.00	0.00	0.43	0.00	0.00 e	0.00	0.00	0.00	0.00
22	0.66	0.29	0.01	0.03	0.01	0.03	0.00	0.02 e	0.00	0.00	0.00	0.00
23	0.89	0.37	0.40	0.18	0.00	0.40	0.05	0.00 e	0.00	0.00	0.00	0.00
24	0.31	0.12	0.32	0.10	0.00	0.22	0.37	0.00 e	0.00	0.00	0.00	0.00
25	0.15	0.93	0.00	0.01	0.02	0.21	0.08	0.00 e	0.00	0.00	0.00	0.35
26	0.15	0.01	0.00	0.00	0.09	0.00	0.00	0.00 e	0.00	0.18	0.00	0.00
27	0.01	0.13	0.35	0.00	0.92	0.13	0.01	0.00 e	0.00	0.00	0.00	0.00
28	0.20	0.70	0.29	0.00	0.00	0.00	0.04	0.00 e	0.00	0.00	0.01	0.00
29	0.12	0.05	0.08	0.00		0.00	0.07	0.00 e	0.00	0.00	0.83	0.00
30	0.52	0.00	0.00	0.00		0.01	0.00	0.00 e	0.00	0.00	0.94	0.00
31	0.61		0.00	0.01		0.28		0.00 e		0.00	0.05	
Total	4.81	4.10	4.46	4.04	3.93	4.84	2.86	0.79	0.14	0.18	2.10	0.89

Total Rainfall for Water Year 2015: 33.14

Precipitation is measured with a tipping bucket rain gauge. Ice and snow accumulations in the rain gauge are not measured until they melt.

Precipitation from snow is not measured accurately

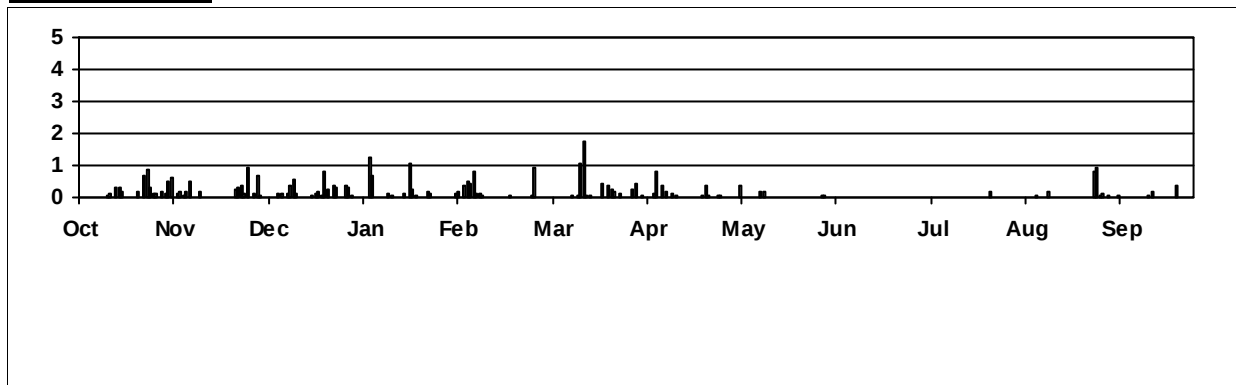
Thurston County Water Resources Unit

Notes:

e= Estimate

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Annual Hyetograph:



05u--Yelm WRF_Rain

Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.97	0.50	0.00	0.05	0.90	0.00	0.00	0.02	0.00	0.00	0.16
02	0.00	0.00	0.06	0.00	0.00	0.18	0.00	0.00	0.04	0.00	0.02	0.03
03	0.02	0.03	0.42	0.00	0.18	0.04	0.12	0.00	0.00	0.00	0.00	0.00
04	0.00	0.06	0.24	0.49	0.33	0.10	0.13	0.00	0.00	0.00	0.00	0.00
05	0.00	0.02	0.04	0.08	0.21	0.09	0.00	0.00	0.00	0.00	0.00	0.04
06	0.00	0.00	0.15	0.00	0.05	0.20	0.00	0.00	0.00	0.00	0.00	0.37
07	0.28	0.16	0.88	0.00	0.00	0.36	0.00	0.00	0.00	0.16	0.36	0.00
08	0.00	0.12	2.20	0.00	0.00	0.06	0.00	0.00	0.00	0.15	0.02	0.00
09	0.01	0.01	0.70	0.01	0.00	0.45	0.00	0.00	0.09	0.04	0.00	0.00
10	0.50	0.01	0.73	0.00	0.00	0.23	0.00	0.00	0.23	0.01	0.00	0.00
11	0.00	0.28	0.04	0.08	0.33	0.22	0.00	0.00	0.01	0.00	0.00	0.00
12	0.00	0.04	0.36	0.31	0.31	0.22	0.37	0.00	0.00	0.01	0.00	0.00
13	0.02	1.29	0.30	0.39	0.44	0.25	0.24	0.00	0.03	0.00	0.00	0.00
14	0.00	2.36	0.00	0.00	0.38	0.85	0.13	0.00	0.67	0.00	0.00	0.00
15	0.00	0.65	0.02	0.11	0.09	0.02	0.00	0.01	0.08	0.00	0.00	0.00
16	0.00	0.10	0.02	0.30	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.01	1.74	1.19	0.25	0.30	0.00	0.00	0.00	0.10	0.00	0.00	0.46
18	0.14	0.08	1.02	0.03	0.09	0.00	0.00	0.00	0.26	0.00	0.00	0.01
19	0.01	0.12	0.16	0.46	0.32	0.01	0.00	0.00	0.00	0.00	0.00	0.07
20	0.03	0.00	0.41	0.46	0.01	0.14	0.04	0.00	0.01	0.00	0.00	0.00
21	0.00	0.00	1.06	0.62	0.09	0.17	0.00	0.18	0.00	0.00	0.00	0.00
22	0.00	0.00	0.24	0.15	0.11	0.05	0.24	0.04	0.00	0.07	0.00	0.00
23	0.00	0.11	0.97	0.77	0.01	0.11	0.14	0.00	0.21	0.00	0.00	0.01
24	0.00	0.32	0.09	0.00	0.00	0.27	0.08	0.00	0.02	0.00	0.00	0.00
25	0.32	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.22	0.01	0.00	0.03	0.23	0.13	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.29	0.22	0.31	0.02	0.00	0.00	0.00	0.00	0.00	0.05
28	0.53	0.00	0.06	0.64	0.39	0.00	0.00	0.01	0.00	0.00	0.00	0.00
29	0.42	0.00	0.00	0.44	0.15	0.00	0.02	0.00	0.00	0.00	0.00	0.00
30	1.18	0.01	0.00	0.10		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	2.82		0.01	0.04		0.00		0.00		0.00	0.04	
Total	6.51	8.49	12.17	5.98	4.43	5.07	1.51	0.24	1.77	0.44	0.44	1.20

Total Rainfall for Water Year 2016: 48.25

Notes:

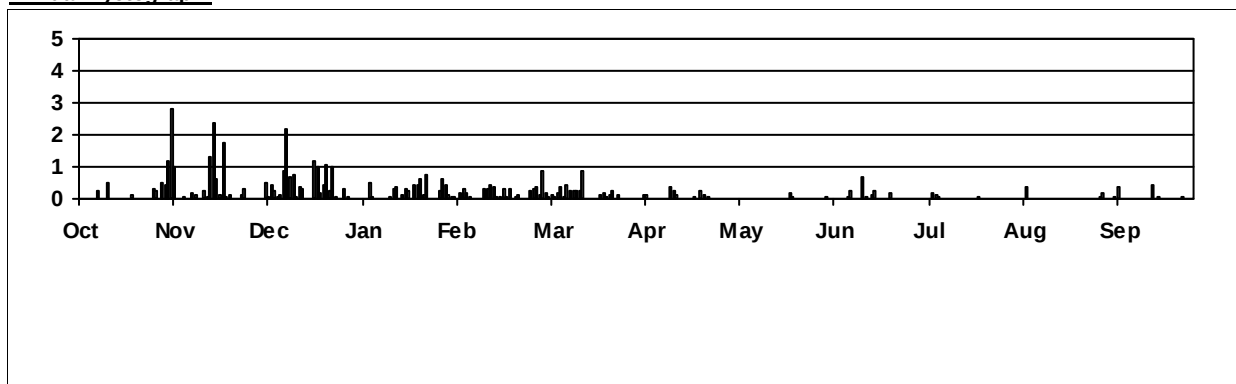
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Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

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10u--Meridian Rd_Rain

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.01	0.00	0.00	0.07	0.03	0.35	0.00	0.03	0.00	0.00	0.23
02	0.00	0.09	0.00	0.01	0.23	0.06	0.00	0.00	0.06	0.00	0.00	0.00
03	0.00	0.31	0.00	0.01	0.02	0.00	0.14	0.00	0.00	0.00	0.00	0.12
04	0.00	0.09	0.01	1.70	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
05	0.00	0.15	0.11	0.84	0.76	0.00	0.00	0.19	0.00	0.00	0.00	0.00
06	0.00	0.50	0.12	0.00	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.04
07	0.00	0.01	0.00	0.00	1.30	0.00	0.09	0.00	0.00	0.00	0.00	0.00
08	0.01	0.00	0.18	0.00	0.20	0.00	0.09	0.00	0.00	0.00	0.00	0.00
09	0.00	0.29	0.56	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.04	0.00	0.79	0.04	0.05	0.00	0.60	0.00	0.00	0.00	0.02	0.00
11	0.25	0.00	0.38	0.05	0.00	0.10	0.17	0.01	0.00	0.00	0.00	0.00
12	0.00	0.00	0.24	0.01	0.00	0.00	0.00	0.34	0.00	0.00	0.00	0.00
13	0.65	0.00	0.01	0.00	0.00	0.16	0.15	0.12	0.00	0.00	0.00	0.00
14	0.22	0.00	0.00	0.00	0.00	1.05	0.02	0.00	0.00	0.00	0.58	0.00
15	0.47	0.00	0.00	0.30	0.00	2.12	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.04	0.01	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.10
17	0.07	0.00	0.10	1.22	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.11
18	0.15	0.00	0.31	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.01	0.03	0.06	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.02
20	0.35	0.03	0.95	0.00	0.02	0.09	0.00	0.00	0.00	0.00	0.00	0.02
21	0.04	0.57	0.14	0.01	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00
22	1.24	0.28	0.00	0.04	0.01	0.06	0.00	0.01	0.00	0.00	0.00	0.00
23	0.63	0.39	0.36	0.23	0.00	0.49	0.09	0.00	0.00	0.00	0.00	0.00
24	0.35	0.24	0.18	0.07	0.00	0.22	0.51	0.00	0.00	0.00	0.00	0.00
25	0.43	0.85	0.01	0.00	0.03	0.28	0.11	0.00	0.00	0.00	0.00	0.35
26	0.15	0.03	0.00	0.01	0.12	0.00	0.00	0.00	0.00	0.01	0.00	0.01
27	0.02	0.45	0.22	0.01	0.96	0.16	0.00	0.00	0.00	0.00	0.00	0.00
28	0.49	0.67	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.09	0.00
29	0.10	0.05	0.01	0.01		0.00	0.04	0.00	0.00	0.00	1.31	0.00
30	0.73	0.00	0.00	0.00		0.05	0.00	0.00	0.00	0.00	0.55	0.00
31	0.54		0.00	0.00		0.18		0.00		0.00	0.04	
Total	6.93	5.02	4.75	5.03	5.26	5.38	2.38	0.67	0.09	0.01	2.59	1.00

Total Rainfall for Water Year 2015: 39.11

Notes:

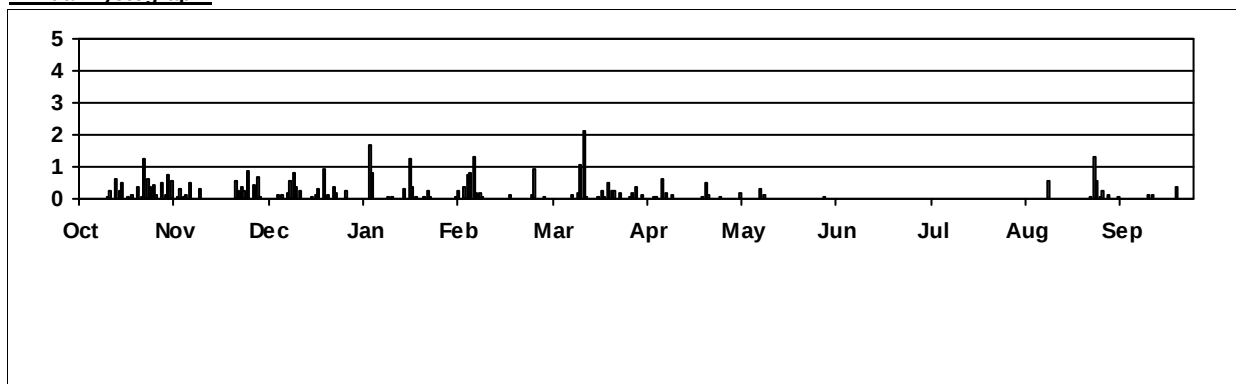
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Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

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Annual Hyetograph:



10u--Meridian Rd_Rain

Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.89	0.61	0.00	0.04	1.44	0.00	0.00	0.09	0.00	0.00	0.16
02	0.01	0.04	0.08	0.01	0.02	0.26	0.00	0.00	0.16	0.00	0.00	0.02
03	0.02	0.01	0.55	0.00	0.30	0.15	0.21	0.00	0.00	0.00	0.00	0.00
04	0.00	0.05	0.31	0.45	0.33	0.15	0.08	0.00	0.00	0.00	0.00	0.00
05	0.00	0.03	0.18	0.10	0.15	0.16	0.01	0.00	0.00	0.00	0.00	0.07
06	0.00	0.00	0.30	0.00	0.20	0.39	0.00	0.00	0.00	0.00	0.00	0.45
07	0.35	0.28	0.92	0.01	0.00	0.50	0.00	0.00	0.00	0.18	0.31	0.00
08	0.00	0.14	2.74	0.00	0.00	0.02	0.00	0.00	0.00	0.14	0.00	0.00
09	0.08	0.03	1.15	0.01	0.00	0.92	0.00	0.00	0.24	0.04	0.00	0.00
10	0.48	0.00	0.75	0.00	0.02	0.28	0.00	0.00	0.15	0.01	0.00	0.00
11	0.01	0.41	0.05	0.10	0.43	0.22	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.34	0.62	0.53	0.58	0.34	0.46	0.00	0.00	0.00	0.00	0.00
13	0.07	2.12	0.40	0.19	0.64	0.52	0.35	0.00	0.06	0.00	0.00	0.00
14	0.00	3.03	0.00	0.01	0.38	0.96	0.10	0.01	0.59	0.00	0.00	0.00
15	0.00	0.77	0.03	0.15	0.11	0.02	0.00	0.01	0.01	0.00	0.00	0.00
16	0.00	0.26	0.04	0.49	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.01	2.37	1.25	0.38	0.36	0.00	0.00	0.00	0.09	0.00	0.00	0.51
18	0.15	0.10	1.05	0.14	0.14	0.00	0.00	0.00	0.01	0.00	0.00	0.00
19	0.04	0.13	0.06	0.43	0.28	0.01	0.00	0.00	0.00	0.00	0.00	0.53
20	0.05	0.00	0.64	0.50	0.09	0.23	0.00	0.00	0.01	0.00	0.00	0.00
21	0.00	0.01	1.10	0.88	0.21	0.36	0.00	0.10	0.00	0.00	0.00	0.00
22	0.00	0.00	0.38	0.23	0.17	0.05	0.24	0.11	0.02	0.04	0.00	0.00
23	0.00	0.10	1.16	0.75	0.00	0.18	0.16	0.00	0.32	0.00	0.00	0.00
24	0.00	0.30	0.12	0.01	0.00	0.20	0.13	0.00	0.04	0.00	0.00	0.00
25	0.31	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
26	0.21	0.00	0.01	0.03	0.31	0.14	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.38	0.49	0.17	0.03	0.00	0.00	0.00	0.00	0.00	0.04
28	0.32	0.00	0.05	0.91	0.57	0.00	0.00	0.03	0.00	0.00	0.00	0.00
29	0.26	0.01	0.00	0.36	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	1.30	0.03	0.01	0.10		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	2.45		0.00	0.07		0.00		0.00		0.00	0.24	
Total	6.12	11.45	14.94	7.33	5.77	7.54	1.74	0.26	1.79	0.41	0.55	1.78

Total Rainfall for Water Year 2016: 59.68

Notes:

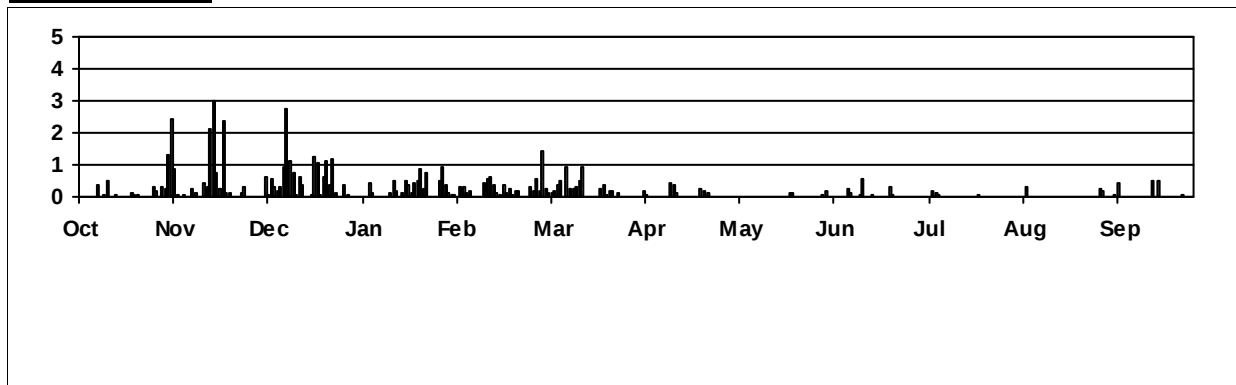
Precipitation is measured with a tipping bucket rain gauge. Ice and snow accumulations in the rain gauge are not measured until they melt.

Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

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Annual Hyetograph:



11u--NOAA Olympia Airport

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.01	0.00	0.00	0.14	0.01	0.01	0.00	0.09	0.00	0.00	0.25
02	0.00	0.17	0.00	0.03	0.39	0.00	0.00	0.00	0.02	0.00	0.00	0.00
03	0.00	0.36	0.00	0.00	0.02	0.00	0.07	0.00	0.00	0.00	0.00	0.10
04	0.00	0.42	0.02	2.23	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
05	0.00	0.23	0.06	1.49	0.83	0.00	0.00	0.30	0.00	0.00	0.00	0.00
06	0.00	0.49	0.23	0.00	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.05
07	0.00	0.00	0.00	0.00	1.38	0.00	0.09	0.00	0.00	0.00	0.00	0.00
08	0.00	0.00	0.13	0.00	0.42	0.00	0.32	0.00	0.00	0.00	0.00	0.00
09	0.00	0.23	0.50	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.05	0.00	0.89	0.02	0.01	0.00	0.44	0.00	0.00	0.00	0.00	0.00
11	0.10	0.00	0.41	0.01	0.00	0.18	0.14	0.02	0.00	0.05	0.00	0.00
12	0.00	0.00	0.36	0.00	0.01	0.00	0.00	0.20	0.00	0.00	0.00	0.00
13	0.41	0.00	0.00	0.00	0.00	0.09	0.14	0.08	0.00	0.00	0.00	0.00
14	0.26	0.00	0.00	0.00	0.00	1.31	0.03	0.00	0.00	0.00	0.93	0.00
15	0.45	0.00	0.00	0.43	0.00	2.10	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.01	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.10
17	0.18	0.00	0.08	1.46	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.20
18	0.06	0.00	0.38	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.05	0.05	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.21	0.07	1.59	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.01
21	0.09	0.79	0.13	0.01	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00
22	1.39	0.31	0.00	0.06	0.00	0.03	0.00	0.02	0.00	0.00	0.00	0.00
23	0.66	0.59	0.26	0.44	0.00	0.51	0.17	0.00	0.00	0.00	0.00	0.00
24	0.39	0.45	0.25	0.14	0.00	0.31	0.44	0.00	0.00	0.00	0.00	0.00
25	0.45	0.85	0.00	0.00	0.02	0.46	0.02	0.00	0.00	0.00	0.00	0.19
26	0.22	0.09	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.10	0.00	0.00
27	0.03	0.68	0.34	0.00	0.47	0.07	0.01	0.00	0.00	0.00	0.00	0.00
28	0.66	0.31	0.08	0.00	0.00	0.02	0.00	0.00	0.03	0.00	0.14	0.00
29	0.02	0.08	0.23	0.00		0.00	0.04	0.00	0.00	0.00	1.25	0.00
30	0.57	0.00	0.00	0.00		0.02	0.00	0.00	0.00	0.00	0.49	0.00
31	0.71		0.00	0.00		0.28		0.00		0.00	0.03	
Total	6.91	6.13	6.00	6.68	5.28	5.94	1.92	0.62	0.14	0.15	2.84	0.90

Total Rainfall for Water Year 2015: 43.51

Notes:

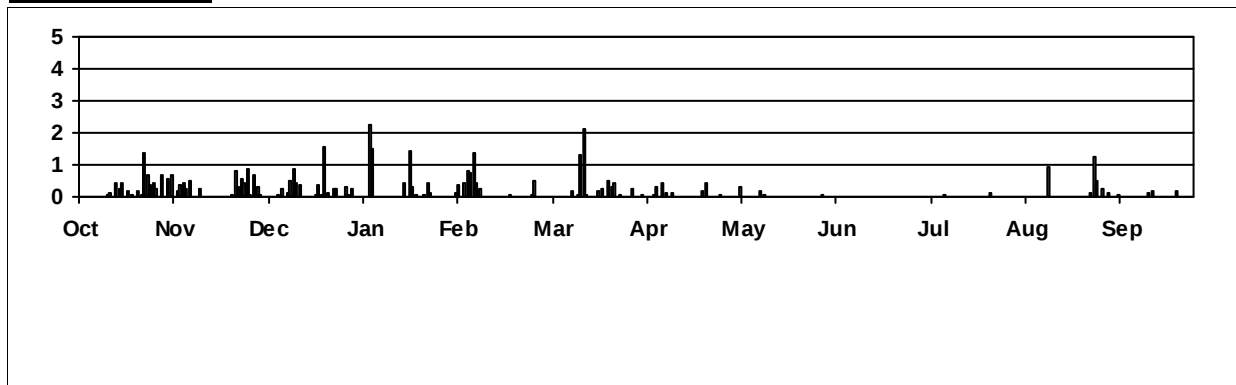
Precipitation is measured with a tipping bucket rain gauge. Ice and snow accumulations in the rain gauge are not measured until they melt.

Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

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Annual Hyetograph:



11u--NOAA Olympia Airport

Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.76	0.74	0.00	0.03	1.70	0.00	0.00	0.05	0.00	0.00	0.18
02	0.01	0.12	0.10	0.00	0.01	0.42	0.00	0.00	0.00	0.00	0.00	0.01
03	0.00	0.00	0.49	0.02	0.33	0.20	0.21	0.00	0.00	0.00	0.00	0.01
04	0.00	0.02	0.36	0.23	0.40	0.20	0.08	0.00	0.00	0.00	0.00	0.02
05	0.00	0.12	0.21	0.10	0.19	0.18	0.02	0.00	0.00	0.00	0.00	0.02
06	0.00	0.01	0.30	0.00	0.31	0.48	0.00	0.00	0.00	0.00	0.00	0.54
07	0.46	0.33	0.97	0.00	0.00	0.37	0.00	0.00	0.00	0.14	0.19	0.00
08	0.00	0.19	2.44	0.00	0.00	0.07	0.00	0.00	0.00	0.22	0.02	0.00
09	0.05	0.00	0.73	0.01	0.00	1.18	0.00	0.00	0.19	0.08	0.00	0.00
10	0.83	0.01	0.73	0.00	0.04	0.54	0.00	0.00	0.16	0.00	0.00	0.00
11	0.00	0.33	0.13	0.15	0.45	0.24	0.00	0.00	0.02	0.00	0.00	0.00
12	0.08	0.77	0.81	0.63	0.68	0.37	0.51	0.00	0.00	0.00	0.00	0.00
13	0.00	2.33	0.43	0.11	0.68	0.37	0.26	0.00	0.03	0.00	0.00	0.00
14	0.00	2.96	0.00	0.00	0.55	0.80	0.18	0.01	0.42	0.00	0.00	0.00
15	0.00	0.76	0.02	0.20	0.17	0.04	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.69	0.03	0.76	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.01	2.08	1.44	0.37	0.33	0.00	0.00	0.00	0.06	0.00	0.00	0.53
18	0.01	0.12	0.84	0.08	0.16	0.00	0.00	0.00	0.04	0.08	0.00	0.00
19	0.04	0.12	0.02	0.47	0.51	0.01	0.00	0.03	0.00	0.00	0.00	0.15
20	0.04	0.00	0.63	0.48	0.14	0.29	0.00	0.00	0.01	0.00	0.00	0.00
21	0.00	0.00	1.02	1.89	0.20	0.31	0.00	0.06	0.00	0.00	0.00	0.00
22	0.00	0.00	0.46	0.25	0.19	0.09	0.22	0.01	0.03	0.10	0.00	0.00
23	0.00	0.09	0.84	0.55	0.00	0.30	0.06	0.00	0.17	0.00	0.00	0.25
24	0.02	0.19	0.23	0.00	0.00	0.24	0.01	0.00	0.06	0.00	0.00	0.00
25	0.22	0.00	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00
26	0.42	0.00	0.00	0.03	0.20	0.15	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.45	0.57	0.14	0.07	0.00	0.00	0.00	0.00	0.00	0.02
28	0.40	0.00	0.07	0.94	0.45	0.00	0.00	0.04	0.00	0.00	0.00	0.00
29	0.11	0.00	0.00	0.48	0.13	0.00	0.01	0.00	0.00	0.00	0.00	0.00
30	1.45	0.01	0.00	0.06		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	2.29		0.00	0.11		0.00		0.00		0.00	0.19	
Total	6.44	12.01	14.50	8.49	6.55	8.63	1.58	0.15	1.24	0.62	0.40	1.73

Total Rainfall for Water Year 2016: 62.34

Notes:

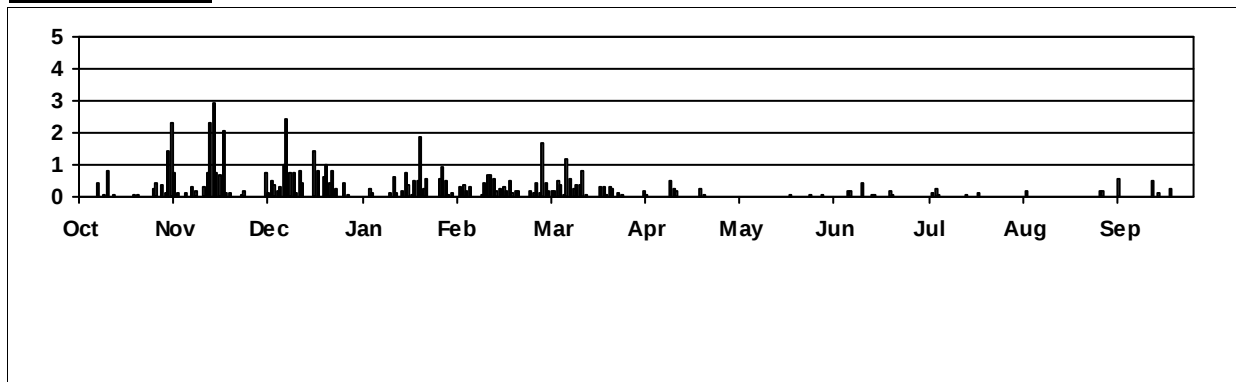
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Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

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11w--Rainier Transfer Station

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.00	0.01	0.00	0.07	0.00	0.12	0.00	0.07	0.00	0.00	0.29
02	0.00	0.09	0.00	0.01	0.23	0.04	0.00	0.00	0.15	0.00	0.00	0.09
03	0.00	0.37	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.11
04	0.00	0.15	0.01	1.83	0.42	0.00	0.00	0.01	0.00	0.00	0.00	0.01
05	0.00	0.18	0.12	1.11	0.85	0.00	0.02	0.30	0.00	0.00	0.00	0.00
06	0.00	0.48	0.15	0.00	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.06
07	0.00	0.01	0.00	0.00	1.17	0.00	0.11	0.00	0.00	0.00	0.00	0.00
08	0.00	0.00	0.04	0.02	0.20	0.00	0.36	0.00	0.00	0.00	0.00	0.00
09	0.00	0.31	0.59	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.03	0.01	0.90	0.04	0.07	0.00	0.55	0.00	0.00	0.01	0.06	0.00
11	0.09	0.00	0.27	0.04	0.00	0.12	0.21	0.06	0.00	0.00	0.00	0.00
12	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00
13	0.45	0.00	0.00	0.00	0.00	0.12	0.19	0.19	0.00	0.00	0.00	0.00
14	0.32	0.00	0.01	0.00	0.00	1.19	0.21	0.00	0.00	0.00	0.34	0.00
15	0.29	0.00	0.00	0.32	0.00	2.19	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.05	0.01	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.06
17	0.07	0.00	0.11	1.25	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.09
18	0.06	0.00	0.39	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.01	0.04	0.08	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.20	0.01	1.35	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.05
21	0.08	0.45	0.33	0.01	0.00	0.73	0.00	0.00	0.00	0.00	0.00	0.00
22	1.08	0.50	0.00	0.04	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
23	1.03	0.52	0.39	0.24	0.00	0.41	0.05	0.00	0.00	0.00	0.00	0.00
24	0.35	0.14	0.30	0.14	0.00	0.25	0.24	0.00	0.00	0.00	0.00	0.00
25	0.30	1.05	0.00	0.01	0.13	0.22	0.20	0.00	0.00	0.00	0.00	0.35
26	0.30	0.02	0.01	0.00	0.22	0.00	0.00	0.00	0.00	0.05	0.00	0.00
27	0.02	0.60	0.34	0.01	0.88	0.17	0.00	0.00	0.00	0.00	0.00	0.00
28	0.26	0.55	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.03	0.00
29	0.17	0.07	0.05	0.01		0.00	0.01	0.00	0.00	0.00	1.19	0.00
30	0.71	0.00	0.00	0.00		0.03	0.00	0.00	0.00	0.00	0.98	0.00
31	0.58		0.00	0.00		0.26		0.00		0.00	0.15	
Total	6.39	5.52	5.53	5.54	5.25	5.94	2.38	0.84	0.22	0.06	2.75	1.11

Total Rainfall for Water Year 2015: 41.53

Notes:

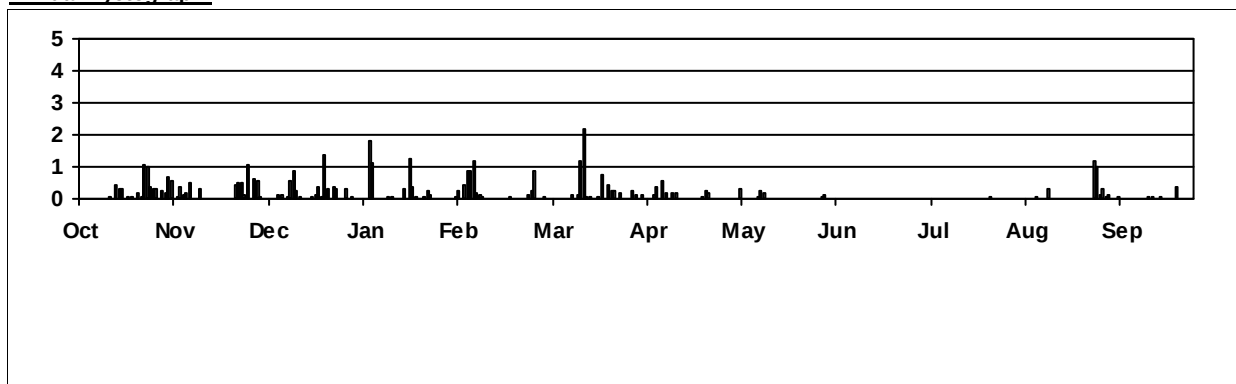
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Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

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11w--Rainier Transfer Station

Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.93	0.52	0.01	0.10	1.21	0.00	0.00	0.04	0.00	0.00 e	0.29 e
02	0.00	0.13	0.05	0.00	0.00	0.29	0.00	0.00	0.06	0.00	0.02 e	0.01 e
03	0.00	0.01	0.62	0.00	0.24	0.09	0.22	0.00	0.00	0.00	0.00 e	0.00 e
04	0.00	0.05	0.29	0.36	0.36	0.16	0.13	0.00	0.00	0.00	0.00 e	0.00 e
05	0.00	0.03	0.07	0.08	0.26	0.16	0.01	0.00	0.00	0.00	0.00 e	0.10 e
06	0.00	0.00	0.46	0.00	0.13	0.35	0.00	0.00	0.00	0.00	0.00 e	0.41 e
07	0.42	0.34	0.96	0.01	0.00	0.38	0.00	0.00	0.01	0.18	0.07 e	0.00 e
08	0.00	0.13	2.51	0.01	0.00	0.04	0.00	0.00	0.00	0.11	0.00 e	0.00 e
09	0.04	0.07	0.80	0.01	0.00	0.58	0.00	0.00	0.05	0.10	0.00 e	0.00 e
10	0.69	0.01	1.08	0.00	0.01	0.35	0.00	0.00	0.32	0.01	0.00 e	0.00 e
11	0.00	0.39	0.06	0.06	0.28	0.32	0.00	0.00	0.04	0.00	0.00 e	0.00 e
12	0.00	0.32	0.57	0.43	0.33	0.36	0.46	0.00	0.00	0.00 e	0.00 e	0.00 e
13	0.13	1.93	0.45	0.34	0.68	0.34	0.40	0.00	0.11	0.00 e	0.00 e	0.00 e
14	0.00	2.86	0.00	0.00	0.45	0.79	0.18	0.02	0.49	0.00 e	0.00 e	0.00
15	0.00	0.74	0.01	0.13	0.12	0.02	0.00	0.01	0.00	0.00 e	0.00 e	0.00
16	0.00	0.37	0.02	0.40	0.07	0.00	0.00	0.00	0.00	0.00 e	0.00 e	0.00
17	0.02	2.12	1.32	0.37	0.38	0.01	0.00	0.00	0.14	0.00 e	0.00 e	0.49
18	0.11	0.08	1.41	0.13	0.13	0.00	0.00	0.00	0.09	0.00 e	0.00 e	0.01
19	0.03	0.11	0.17	0.47	0.39	0.01	0.00	0.11	0.00	0.00 e	0.00 e	0.10
20	0.08	0.00	0.60	0.42	0.02	0.21	0.01	0.00	0.00	0.00 e	0.00 e	0.00
21	0.00	0.00	1.11	0.77	0.16	0.30	0.00	0.09	0.00	0.00 e	0.00 e	0.00
22	0.00	0.01	0.30	0.30	0.18	0.07	0.22	0.10	0.01	0.03 e	0.00 e	0.00
23	0.00	0.11	1.24	0.63	0.00	0.22	0.23	0.00	0.24	0.00 e	0.00 e	0.02
24	0.00	0.34	0.12	0.00	0.00	0.23	0.08	0.00	0.06	0.00 e	0.00 e	0.00
25	0.33	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00 e	0.00 e	0.00
26	0.40	0.00	0.00	0.03	0.24	0.11	0.00	0.00	0.00	0.00 e	0.00 e	0.00
27	0.00	0.00	0.35	0.33	0.45	0.06	0.00	0.00	0.00	0.00 e	0.00 e	0.02
28	0.21	0.01	0.04	0.94	0.50	0.00	0.00	0.00	0.00	0.00 e	0.00 e	0.00
29	0.47	0.00	0.00	0.54	0.18	0.00	0.00	0.00	0.00	0.00 e	0.00 e	0.00
30	1.47	0.01	0.00	0.19		0.00	0.00	0.00	0.00	0.00 e	0.00 e	0.00
31	2.80		0.00	0.10		0.00		0.00		0.00 e	0.09 e	
Total	7.20	11.10	15.17	7.06	5.66	6.66	1.94	0.33	1.66	0.43	0.18	1.45

Total Rainfall for Water Year 2016: 58.84

Notes:

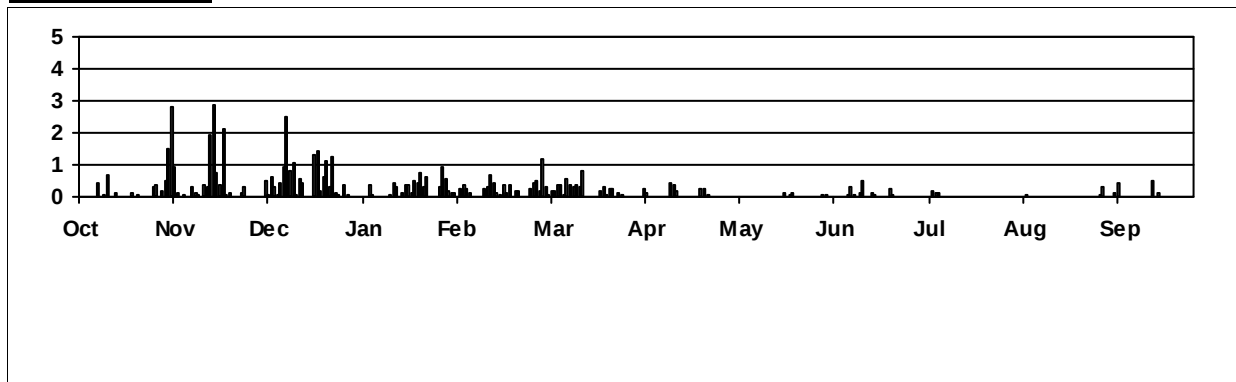
Precipitation is measured with a tipping bucket rain gauge. Ice and snow accumulations in the rain gauge are not measured until they melt.

Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

Visit our website at

Annual Hyetograph:



13u--Lake Lawrence_Rain

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.00	0.02	0.00	0.05	0.00	0.10	0.00	0.10	0.00	0.00	0.20
02	0.00	0.06	0.00	0.01	0.17	0.04	0.01	0.00	0.18	0.00	0.00	0.11
03	0.00	0.26	0.01	0.01	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.04
04	0.00	0.11	0.03	1.44	0.30	0.00	0.00	0.15	0.00	0.00	0.00	0.01
05	0.00	0.10	0.10	0.80	0.43	0.00	0.00	0.44	0.00	0.00	0.00	0.00
06	0.00	0.63	0.16	0.00	0.52	0.00	0.09	0.00	0.00	0.00	0.00	0.03
07	0.00	0.01	0.00	0.00	0.63	0.00	0.13	0.00	0.00	0.00	0.00	0.00
08	0.00	0.00	0.03	0.01	0.18	0.00	0.26	0.00	0.00	0.00	0.00	0.00
09	0.01	0.23	0.35	0.00	0.07	0.00	0.01	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.63	0.00	0.04	0.00	0.34	0.00	0.00	0.00	0.09	0.00
11	0.03	0.01	0.17	0.04	0.00	0.03	0.19	0.07	0.00	0.00	0.00	0.00
12	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.00
13	0.39	0.00	0.00	0.00	0.00	0.04	0.18	0.13	0.00	0.00	0.00	0.00
14	0.24	0.00	0.01	0.00	0.00	0.93	0.20	0.01	0.00	0.00	0.22	0.00
15	0.32	0.00	0.00	0.15	0.00	1.39	0.01	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.14	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.08
17	0.02	0.00	0.09	0.97	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.04
18	0.02	0.00	0.14	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.04	0.15	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.45	0.00	0.90	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.05
21	0.05	0.35	0.35	0.00	0.02	0.29	0.00	0.00	0.00	0.00	0.00	0.00
22	0.86	0.26	0.01	0.06	0.00	0.04	0.00	0.02	0.00	0.00	0.00	0.00
23	0.56	0.58	0.39	0.16	0.00	0.47	0.06	0.00	0.00	0.00	0.00	0.00
24	0.28	0.03	0.36	0.10	0.00	0.31	0.22	0.00	0.00	0.00	0.00	0.00
25	0.30	0.72	0.00	0.01	0.07	0.18	0.19	0.00	0.00	0.02	0.00	0.29
26	0.15	0.00	0.01	0.01	0.11	0.00	0.00	0.00	0.00	0.42	0.00	0.00
27	0.00	0.20	0.38	0.00	0.75	0.18	0.01	0.00	0.00	0.01	0.00	0.00
28	0.14	0.58	0.10	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.02	0.00
29	0.07	0.13	0.03	0.00		0.00	0.02	0.01	0.00	0.00	0.86	0.00
30	0.54	0.01	0.00	0.00		0.02	0.00	0.00	0.00	0.00	0.22	0.00
31	0.64		0.00	0.01		0.38		0.00		0.00	0.01	
Total	5.07	4.27	4.55	4.39	3.39	4.38	2.10	1.10	0.28	0.45	1.42	0.85

Total Rainfall for Water Year 2015: 32.25

Notes:

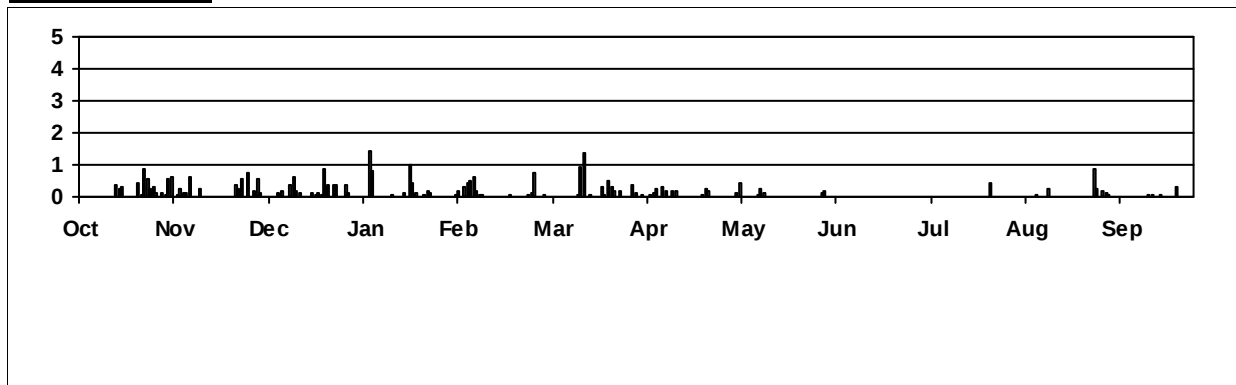
Precipitation is measured with a tipping bucket rain gauge. Ice and snow accumulations in the rain gauge are not measured until they melt.

Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

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Annual Hyetograph:



13u--Lake Lawrence_Rain

Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	1.27	0.33	0.00	0.01	0.94	0.00	0.00	0.01	0.00	0.00	0.16
02	0.00	0.15	0.08	0.01	0.00	0.19	0.00	0.00	0.08	0.00	0.06	0.01
03	0.03	0.02	0.44	0.00	0.22	0.12	0.20	0.00	0.00	0.00	0.00	0.00
04	0.00	0.05	0.22	0.43	0.36	0.05	0.52	0.00	0.00	0.00	0.00	0.00
05	0.00	0.04	0.05	0.04	0.26	0.17	0.00	0.00	0.00	0.00	0.00	0.03
06	0.00	0.00	0.22	0.00	0.08	0.38	0.00	0.00	0.00	0.00	0.00	0.23
07	0.34	0.22	1.00	0.00	0.00	0.29	0.00	0.00	0.00	0.11	0.27	0.01
08	0.00	0.18	2.24	0.01	0.00	0.03	0.00	0.00	0.00	0.21	0.06	0.00
09	0.01	0.02	0.62	0.00	0.00	0.50	0.00	0.00	0.07	0.07	0.00	0.00
10	0.35	0.00	0.82	0.00	0.01	0.25	0.00	0.00	0.29	0.01	0.00	0.00
11	0.00	0.26	0.01	0.07	0.30	0.14	0.00	0.00	0.08	0.00	0.00	0.00
12	0.00	0.06	0.37	0.25	0.39	0.21	0.35	0.00	0.00	0.00	0.00	0.00
13	0.01	1.21	0.30	0.27	0.43	0.46	0.35	0.00	0.15	0.00	0.00	0.00
14	0.01	2.47	0.00	0.01	0.31	0.60	0.15	0.01	0.39	0.00	0.00	0.00
15	0.00	0.69	0.01	0.09	0.12	0.02	0.00	0.05	0.12	0.00	0.00	0.00
16	0.00	0.16	0.01	0.35	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.02	2.09	1.15	0.25	0.39	0.00	0.00	0.00	0.08	0.00	0.00	0.36
18	0.19	0.07	0.83	0.08	0.12	0.00	0.00	0.00	0.22	0.00	0.00	0.00
19	0.01	0.12	0.12	0.47	0.42	0.02	0.00	0.15	0.00	0.01	0.00	0.08
20	0.06	0.00	0.50	0.34	0.01	0.16	0.01	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.84	0.47	0.13	0.07	0.00	0.12	0.00	0.00	0.00	0.00
22	0.00	0.00	0.14	0.20	0.04	0.13	0.16	0.22	0.00	0.10	0.00	0.00
23	0.00	0.07	1.35	0.62	0.00	0.16	0.12	0.00	0.16	0.00	0.00	0.01
24	0.00	0.38	0.10	0.00	0.00	0.33	0.14	0.00	0.10	0.00	0.00	0.00
25	0.33	0.01	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
26	0.32	0.00	0.00	0.05	0.20	0.11	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.37	0.14	0.32	0.17	0.00	0.00	0.00	0.00	0.00	0.05
28	0.13	0.00	0.06	0.61	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.12	0.00	0.00	0.36	0.15	0.00	0.02	0.00	0.00	0.00	0.00	0.00
30	1.30	0.01	0.00	0.10		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	2.92		0.00	0.07		0.00		0.00		0.00	0.00	
Total	6.15	9.55	12.19	5.29	4.86	5.52	2.02	0.55	1.75	0.51	0.39	0.94

Total Rainfall for Water Year 2016: 49.72

Notes:

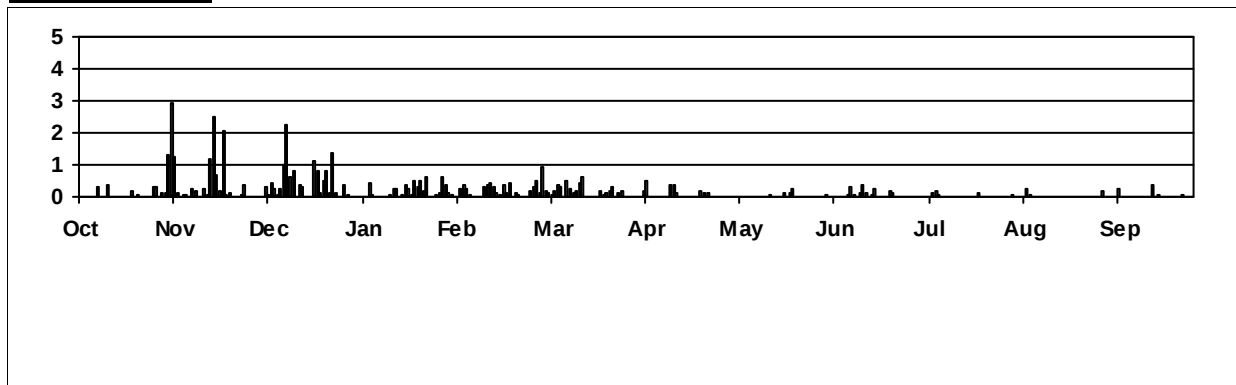
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Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

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Annual Hyetograph:



18w--WARC TC_Rain

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.00	0.00	0.00	0.09	0.00	0.23	0.00	0.03	0.00	0.00	0.24
02	0.00	0.12	0.00	0.01	0.26	0.00	0.00	0.00	0.01	0.00	0.00	0.02
03	0.00	0.27	0.00	0.02	0.02	0.00	0.08	0.00	0.00	0.00	0.00	0.26
04	0.00	0.19	0.02	1.75	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
05	0.00	0.18	0.12	0.94	0.69	0.00	0.00	0.46	0.00	0.00	0.00	0.00
06	0.00	0.62	0.13	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.09
07	0.00	0.01	0.00	0.01	1.40	0.00	0.06	0.00	0.00	0.00	0.00	0.00
08	0.00	0.00	0.26	0.00	0.23	0.00	0.01	0.00	0.00	0.00	0.00	0.00
09	0.00	0.25	0.42	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.03	0.00	0.76	0.05	0.00	0.00	0.53	0.00	0.00	0.00	0.02	0.00
11	0.05	0.00	0.27	0.07	0.00	0.11	0.07	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.25	0.00	0.02	0.00	0.00	0.28	0.00	0.00	0.00	0.00
13	0.46	0.00	0.00	0.00	0.00	0.17	0.05	0.14	0.00	0.00	0.00	0.00
14	0.30	0.00	0.00	0.00	0.00	0.95	0.00	0.00	0.00	0.00	0.59	0.00
15	0.12	0.00	0.01	0.40	0.00	1.89	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.02	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.06
17	0.14	0.00	0.09	1.22	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.14
18	0.07	0.00	0.35	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.02	0.02	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01
20	0.31	0.00	1.08	0.00	0.02	0.15	0.00	0.00	0.00	0.00	0.00	0.00
21	0.03	0.56	0.22	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.00
22	1.27	0.38	0.00	0.08	0.00	0.02	0.00	0.03	0.00	0.00	0.00	0.00
23	0.63	0.70	0.38	0.19	0.00	0.37	0.05	0.02	0.00	0.00	0.00	0.00
24	0.35	0.26	0.15	0.05	0.00	0.15	0.28	0.00	0.00	0.00	0.00	0.00
25	0.36	1.10	0.01	0.00	0.07	0.19	0.03	0.00	0.00	0.00	0.00	0.16
26	0.17	0.01	0.00	0.00	0.31	0.00	0.00	0.00	0.00	0.12	0.00	0.00
27	0.05	0.54	0.23	0.01	0.69	0.12	0.00	0.00	0.00	0.00	0.00	0.00
28	0.68	0.81	0.25	0.00	0.00	0.05	0.01	0.00	0.00	0.00	0.08	0.00
29	0.05	0.01	0.06	0.00		0.00	0.04	0.00	0.00	0.00	1.07	0.00
30	0.47	0.00	0.00	0.00		0.03	0.00	0.00	0.00	0.00	0.47	0.00
31	0.52		0.00	0.00		0.05		0.00		0.00	0.02	
Total	6.06	6.03	5.10	5.00	5.07	4.57	1.44	0.93	0.04	0.12	2.25	0.98

Total Rainfall for Water Year 2015: 37.59

Notes:

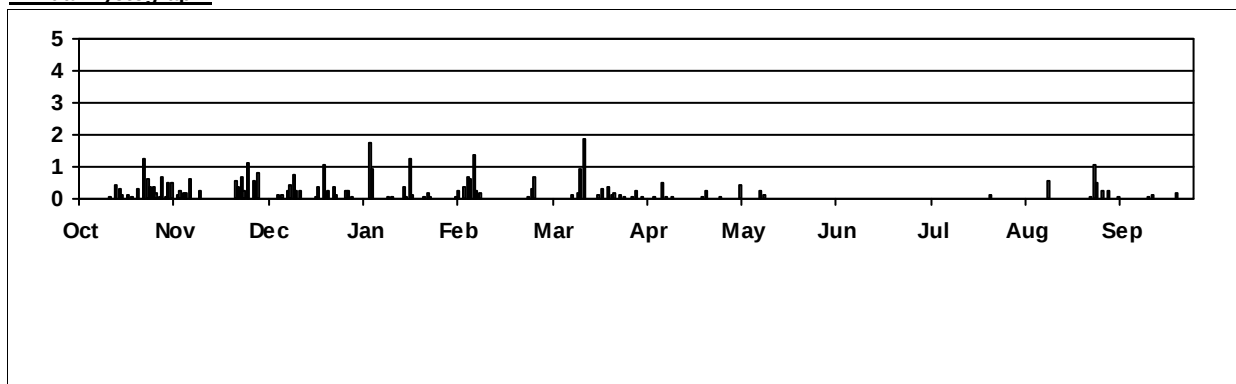
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Precipitation from snow is not measured accurately

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Annual Hyetograph:



18w--WARC TC_Rain

Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.83	0.62	0.00	0.04	1.38	0.00	0.00	0.09	0.00	0.00	0.16
02	0.00	0.11	0.08	0.00	0.01	0.21	0.00	0.00	0.00	0.00	0.00	0.01
03	0.00	0.00	0.47	0.00	0.35	0.19	0.17	0.00	0.00	0.00	0.00	0.00
04	0.00	0.00	0.35	0.40	0.31	0.16	0.19	0.00	0.00	0.00	0.00	0.00
05	0.00	0.04	0.28	0.16	0.30	0.13	0.00	0.00	0.00	0.00	0.00	0.04
06	0.00	0.00	0.17	0.01	0.18	0.32	0.00	0.00	0.00	0.00	0.00	0.39
07	0.37	0.15	1.01	0.00	0.00	0.31	0.00	0.00	0.00	0.09	0.10	0.00
08	0.00	0.20	2.29	0.00	0.00	0.09	0.00	0.00	0.00	0.06	0.00	0.00
09	0.03	0.03	0.60	0.00	0.00	1.02	0.00	0.00	0.15	0.04	0.00	0.00
10	1.06	0.00	0.60	0.00	0.01	0.41	0.00	0.00	0.30	0.00	0.00	0.00
11	0.00	0.25	0.07	0.15	0.43	0.26	0.00	0.00	0.00	0.00	0.00	0.00
12	0.05	0.43	0.75	0.53	0.54	0.25	0.51	0.00	0.00	0.00	0.00	0.00
13	0.04	2.07	0.23	0.11	0.66	0.30	0.27	0.00	0.04	0.00	0.00	0.00
14	0.00	2.80	0.00	0.00	0.26	0.66	0.31	0.00	0.32	0.00	0.00	0.00
15	0.00	0.71	0.00	0.16	0.13	0.05	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.31	0.03	0.54	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.01	1.72	1.04	0.35	0.28	0.00	0.00	0.00	0.10	0.00	0.00	0.38
18	0.01	0.10	0.81	0.10	0.09	0.00	0.00	0.00	0.14	0.00	0.00	0.01
19	0.03	0.10	0.02	0.39	0.54	0.01	0.00	0.01	0.00	0.00	0.00	0.18
20	0.00	0.00	0.31	0.41	0.20	0.28	0.01	0.00	0.02	0.00	0.00	0.00
21	0.00	0.00	1.17	1.36	0.21	0.27	0.00	0.31	0.00	0.00	0.00	0.00
22	0.00	0.01	0.41	0.26	0.17	0.08	0.26	0.01	0.03	0.04	0.00	0.00
23	0.00	0.07	0.71	0.64	0.00	0.16	0.03	0.00	0.24	0.00	0.00	0.05
24	0.00	0.22	0.15	0.00	0.00	0.28	0.03	0.00	0.05	0.00	0.00	0.00
25	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.18	0.00	0.00	0.01	0.20	0.14	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.41	0.68	0.19	0.03	0.00	0.00	0.00	0.00	0.00	0.01
28	0.21	0.00	0.07	0.82	0.45	0.00	0.00	0.06	0.00	0.00	0.00	0.00
29	0.28	0.01	0.00	0.41	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	1.17	0.00	0.01	0.06		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	1.82		0.00	0.02		0.00		0.00		0.00	0.08	
Total	5.49	10.16	12.66	7.57	5.80	6.99	1.78	0.39	1.48	0.23	0.18	1.23

Total Rainfall for Water Year 2016: 53.96

Notes:

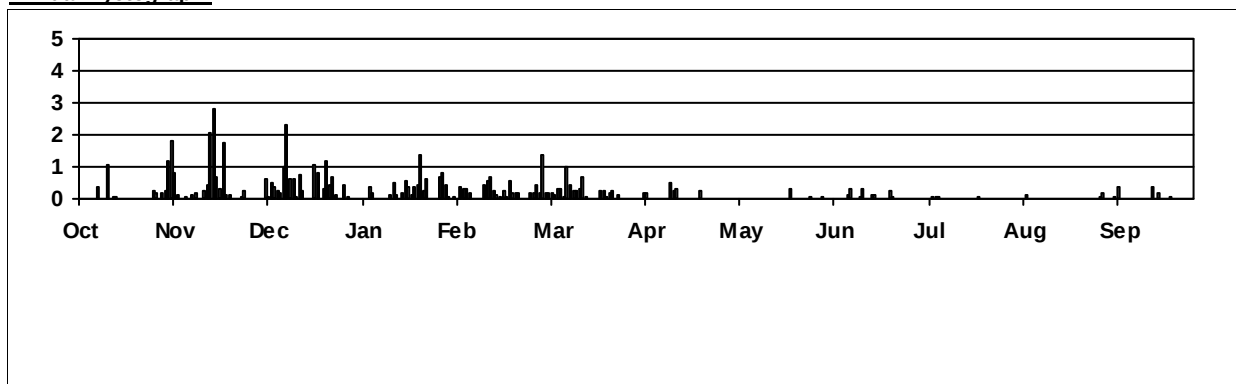
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Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

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Annual Hyetograph:



24u--McLane FS Wx

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.00	0.00	0.00	0.10	0.02	0.01	0.00	0.18	0.00	0.00	0.36
02	0.00	0.19	0.01	0.02	0.48	0.01	0.00	0.00	0.01	0.00	0.00	0.02
03	0.00	0.56	0.00	0.00	0.02	0.00	0.11	0.00	0.00	0.00	0.00	0.11
04	0.00	0.60	0.07	2.50	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.01
05	0.00	0.23	0.22	1.22	1.25	0.00	0.00	0.15	0.00	0.00	0.00	0.01
06	0.00	0.58	0.20	0.00	1.20	0.00	0.00	0.00	0.00	0.00	0.00	0.20
07	0.00	0.01	0.00	0.02	1.57	0.00	0.08	0.00	0.00	0.00	0.00	0.00
08	0.00	0.00	0.28	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.01	0.00
09	0.00	0.12	0.80	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.05	0.00	1.34	0.12	0.02	0.01	0.76	0.00	0.00	0.00	0.00	0.00
11	0.59	0.00	0.45	0.05	0.00	0.28	0.08	0.01	0.00	0.04	0.00	0.00
12	0.00	0.00	0.20	0.00	0.03	0.01	0.03	0.17	0.00	0.01	0.00	0.00
13	0.41	0.00	0.00	0.00	0.01	0.18	0.15	0.10	0.00	0.03	0.00	0.07
14	0.19	0.00	0.00	0.00	0.00	1.50	0.06	0.00	0.00	0.00	0.98	0.00
15	0.25	0.00	0.01	0.66	0.00	2.41	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.04	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.11
17	0.36	0.00	0.09	1.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16
18	0.20	0.00	0.57	0.16	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00
19	0.00	0.01	0.14	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.26	0.02	2.41	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.04
21	0.20	1.38	0.60	0.01	0.01	0.30	0.00	0.00	0.07	0.00	0.00	0.00
22	1.89	0.36	0.01	0.07	0.01	0.10	0.00	0.06	0.00	0.00	0.00	0.00
23	0.79	0.71	0.37	0.41	0.00	0.86	0.11	0.00	0.00	0.00	0.00	0.00
24	0.41	0.39	0.16	0.06	0.00	0.14	0.25	0.00	0.00	0.00	0.00	0.00
25	0.97	0.84	0.00	0.00	0.04	0.57	0.01	0.01	0.00	0.00	0.00	0.23
26	0.34	0.15	0.00	0.00	0.11	0.00	0.01	0.00	0.00	0.00	0.00	0.00
27	0.11	1.31	0.30	0.00	0.59	0.04	0.02	0.00	0.00	0.00	0.00	0.00
28	0.82	0.34	0.22	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.19	0.00
29	0.19	0.01	0.17	0.00		0.00	0.17	0.00	0.00	0.00	1.34	0.00
30	0.51	0.00	0.00	0.00		0.04	0.00	0.00	0.00	0.00	0.38	0.00
31	0.52		0.00	0.01		0.13		0.00		0.00	0.06	
Total	9.06	7.81	8.66	7.04	6.58	6.92	1.85	0.50	0.30	0.08	2.96	1.32

Total Rainfall for Water Year 2015: 53.08

Notes:

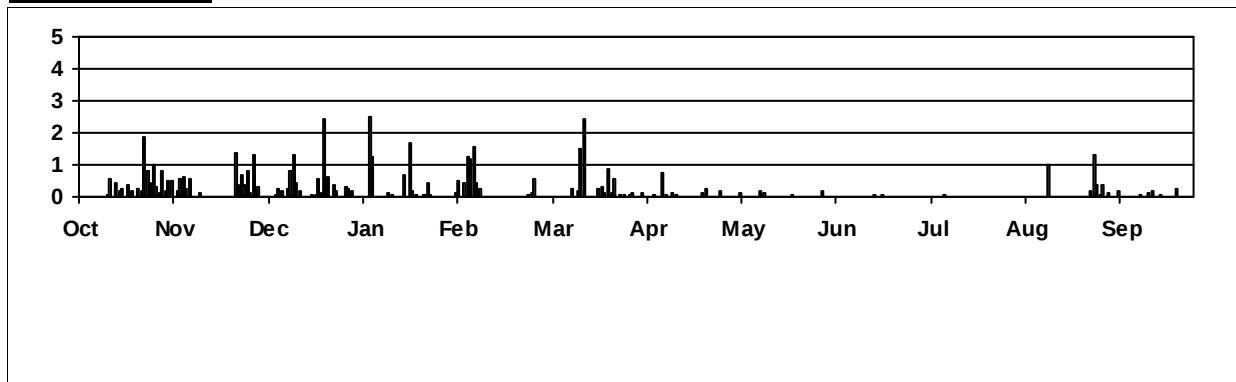
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Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

Visit our website at

Annual Hyetograph:



24u--McLane FS Wx

Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.74	1.04	0.00	0.01	2.08	0.00	0.00	0.02	0.00	0.00	0.33
02	0.01	0.04	0.15	0.00	0.06	0.37	0.00	0.00	0.00	0.00	0.00	0.05
03	0.00	0.00	0.59	0.00	0.59	0.12	0.27	0.00	0.00	0.00	0.00	0.00
04	0.00	0.01	0.27	0.37	0.33	0.30	0.13	0.01	0.00	0.00	0.00	0.07
05	0.00	0.06	0.53	0.20	0.60	0.36	0.01	0.00	0.00	0.00	0.00	0.07
06	0.00	0.01	0.83	0.01	0.24	0.99	0.00	0.00	0.00	0.00	0.00	0.40
07	0.50	0.64	1.13	0.00	0.00	0.25	0.00	0.00	0.00	0.21	0.15	0.00
08	0.00	0.54	2.55	0.00	0.00	0.17	0.00	0.00	0.00	0.40	0.02	0.00
09	0.03	0.00	0.63	0.00	0.00	2.20	0.00	0.01	0.46	0.08	0.00	0.00
10	1.23	0.11	1.14	0.00	0.03	0.58	0.00	0.00	0.36	0.00	0.00	0.00
11	0.00	0.26	0.24	0.32	0.42	0.31	0.00	0.00	0.00	0.00	0.29	0.00
12	0.00	1.29	1.26	0.98	0.59	0.50	0.38	0.00	0.00	0.00	0.00	0.00
13	0.01	2.81	0.33	0.13	1.00	0.92	0.36	0.00	0.00	0.00	0.01	0.00
14	0.00	3.33	0.00	0.00	0.44	0.68	0.20	0.00	0.16	0.00	0.00	0.00
15	0.00	0.74	0.03	0.31	0.35	0.07	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	1.13	0.01	1.25	0.15	0.00	0.00	0.00	0.02	0.00	0.00	0.00
17	0.02	2.36	1.60	0.50	0.31	0.00	0.00	0.00	0.04	0.00	0.00	0.46
18	0.11	0.14	0.91	0.11	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.01
19	0.03	0.10	0.03	0.47	0.78	0.00	0.00	0.01	0.00	0.00	0.00	0.18
20	0.04	0.00	0.48	0.81	0.21	0.26	0.00	0.01	0.04	0.00	0.00	0.00
21	0.00	0.01	1.32	2.42	0.18	0.83	0.00	0.07	0.00	0.00	0.00	0.00
22	0.00	0.00	0.64	0.23	0.09	0.03	0.22	0.00	0.04	0.03	0.00	0.00
23	0.00	0.08	0.83	0.44	0.00	0.40	0.01	0.02	0.12	0.00	0.00	0.57
24	0.03	0.22	0.26	0.00	0.00	0.26	0.02	0.01	0.02	0.00	0.00	0.00
25	0.54	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.59	0.00	0.00	0.05	0.17	0.42	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.01	0.64	0.98	0.11	0.04	0.00	0.00	0.00	0.00	0.00	0.01
28	0.36	0.00	0.13	1.30	0.50	0.00	0.00	0.07	0.00	0.00	0.00	0.00
29	0.19	0.00	0.00	0.64	0.22	0.00	0.01	0.00	0.00	0.00	0.00	0.00
30	1.41	0.02	0.00	0.10		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	2.14		0.01	0.03		0.00		0.00		0.00	0.06	
Total	7.24	14.65	17.59	11.65	7.60	12.14	1.61	0.21	1.28	0.72	0.53	2.15

Total Rainfall for Water Year 2016: 77.37

Notes:

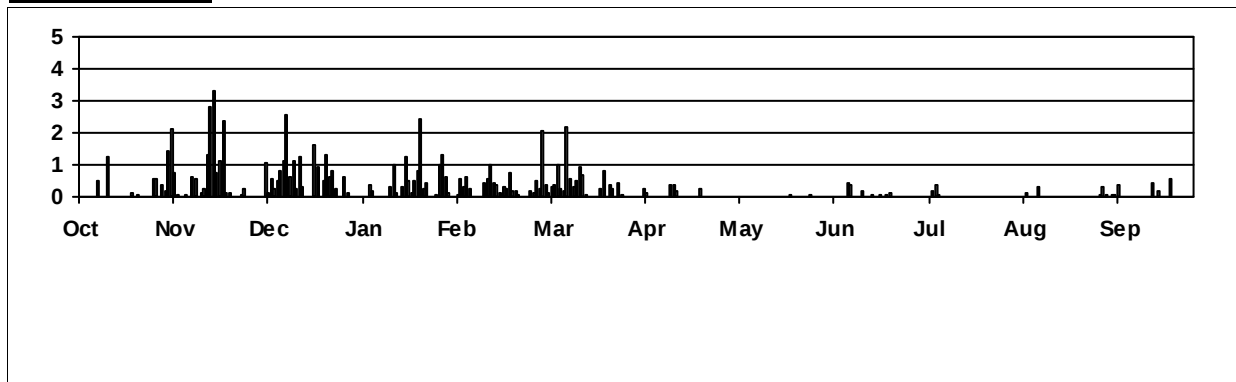
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Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

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Annual Hyetograph:



27u--Boston Harbor_Rain

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.00	0.00	0.00	0.13	0.00	0.04	0.00	0.11	0.00	0.00	0.41
02	0.00	0.18	0.00	0.03	0.40	0.01	0.00	0.00	0.02	0.00	0.00	0.00
03	0.00	0.40	0.00	0.00	0.08	0.00	0.02	0.00	0.00	0.00	0.00	0.11
04	0.00	0.16	0.11	2.02	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00
05	0.00	0.20	0.15	1.02	0.83	0.00	0.00	0.10	0.00	0.00	0.00	0.00
06	0.00	0.40	0.14	0.00	0.69	0.00	0.02	0.01	0.00	0.00	0.00	0.24
07	0.00	0.00	0.01	0.01	1.34	0.00	0.06	0.00	0.00	0.00	0.00	0.00
08	0.00	0.00	0.29	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.03	0.00
09	0.00	0.25	0.62	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.04	0.00	1.10	0.13	0.01	0.01	0.59	0.00	0.00	0.00	0.00	0.00
11	0.20	0.00	0.43	0.07	0.02	0.19	0.12	0.00	0.00	0.08	0.00	0.00
12	0.02	0.00	0.10	0.00	0.08	0.00	0.01	0.13	0.00	0.00	0.00	0.00
13	0.50	0.00	0.01	0.00	0.00	0.19	0.07	0.12	0.00	0.02	0.00	0.00
14	0.19	0.00	0.00	0.00	0.00	0.96	0.00	0.01	0.00	0.00	0.89	0.00
15	0.14	0.00	0.00	0.44	0.00	2.02	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11
17	0.19	0.00	0.16	1.23	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.20
18	0.18	0.00	0.47	0.36	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
19	0.03	0.00	0.08	0.23	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.21	0.01	1.54	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.11
21	0.12	0.74	0.15	0.01	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00
22	1.41	0.26	0.01	0.09	0.00	0.13	0.00	0.18	0.00	0.00	0.00	0.00
23	0.59	0.55	0.45	0.52	0.00	0.49	0.15	0.00	0.00	0.00	0.00	0.00
24	0.34	0.51	0.12	0.10	0.00	0.22	0.19	0.00	0.00	0.00	0.00	0.00
25	0.84	1.23	0.01	0.00	0.00	0.41	0.12	0.00	0.00	0.00	0.00	0.16
26	0.17	0.11	0.01	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.01
27	0.16	0.63	0.31	0.01	0.74	0.06	0.00	0.00	0.00	0.00	0.00	0.00
28	0.37	0.57	0.12	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.18	0.00
29	0.09	0.00	0.23	0.00		0.00	0.03	0.00	0.00	0.00	1.33	0.00
30	0.60	0.00	0.00	0.00		0.02	0.00	0.00	0.00	0.00	0.46	0.00
31	0.55		0.00	0.00		0.06		0.00		0.00	0.00	
Total	6.94	6.20	6.67	6.27	5.53	5.18	1.42	0.55	0.17	0.10	2.89	1.35

Total Rainfall for Water Year 2015: 43.27

Notes:

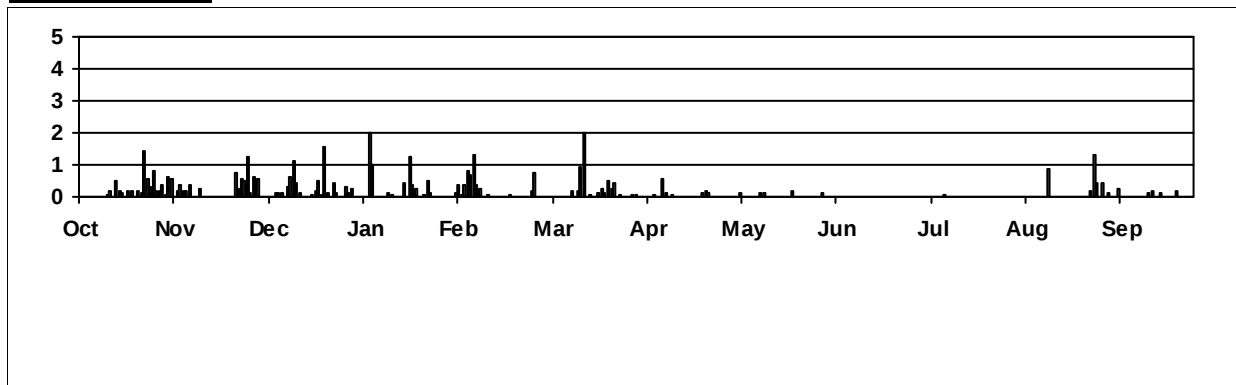
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Precipitation from snow is not measured accurately

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Annual Hyetograph:



27u--Boston Harbor_Rain

Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.48	0.70	0.00	0.03	1.64	0.00	0.00	0.07	0.00	0.00	0.31
02	0.01	0.01	0.11	0.00	0.04	0.24	0.00	0.00	0.01	0.00	0.00	0.03
03	0.00	0.00	0.59	0.03	0.49	0.07	0.18	0.00	0.00	0.00	0.00	0.00
04	0.00	0.00	0.27	0.22	0.33	0.25	0.25	0.01	0.00	0.00	0.00	0.00
05	0.00	0.06	0.69	0.18	0.24	0.29	0.01	0.00	0.00	0.00	0.00	0.05
06	0.00	0.01	0.37	0.01	0.16	0.84	0.00	0.00	0.00	0.00	0.00	0.35
07	0.47	0.42	1.17	0.00	0.00	0.37	0.00	0.00	0.00	0.17	0.13	0.00
08	0.00	0.47	2.09	0.00	0.00	0.18	0.00	0.00	0.00	0.23	0.00	0.00
09	0.03	0.08	0.47	0.00	0.00	1.83	0.00	0.00	0.44	0.04	0.00	0.00
10	1.63	0.02	0.87	0.00	0.06	0.57	0.00	0.00	0.28	0.00	0.00	0.00
11	0.00	0.27	0.21	0.17	0.54	0.32	0.00	0.00	0.00	0.00	0.00	0.00
12	0.06	0.44	0.88	0.86	0.53	0.29	0.41	0.00	0.00	0.00	0.00	0.00
13	0.01	2.03	0.27	0.04	0.78	0.70	0.23	0.00	0.03	0.00	0.00	0.00
14	0.00	3.06	0.01	0.00	0.34	0.73	0.13	0.00	0.10	0.00	0.00	0.00
15	0.00	0.86	0.02	0.19	0.24	0.10	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.64	0.00	1.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	1.51	1.50	0.39	0.39	0.00	0.00	0.00	0.08	0.00	0.00	0.39
18	0.06	0.12	1.08	0.08	0.17	0.00	0.00	0.00	0.01	0.00	0.00	0.01
19	0.02	0.10	0.03	0.43	0.86	0.00	0.00	0.01	0.00	0.00	0.00	0.37
20	0.00	0.00	0.44	0.63	0.12	0.35	0.01	0.00	0.03	0.00	0.00	0.00
21	0.00	0.00	1.13	2.00	0.15	0.66	0.00	0.14	0.00	0.00	0.00	0.00
22	0.00	0.00	0.45	0.29	0.07	0.02	0.19	0.00	0.05	0.02	0.00	0.00
23	0.00	0.14	0.51	0.50	0.00	0.23	0.08	0.00	0.15	0.00	0.00	0.25
24	0.01	0.27	0.21	0.00	0.00	0.32	0.00	0.00	0.03	0.00	0.00	0.00
25	0.34	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
26	0.41	0.00	0.00	0.05	0.18	0.23	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.46	0.81	0.06	0.07	0.00	0.00	0.00	0.00	0.00	0.01
28	0.38	0.00	0.06	0.87	0.58	0.00	0.00	0.11	0.00	0.00	0.00	0.00
29	0.26	0.00	0.00	0.65	0.19	0.00	0.01	0.00	0.00	0.00	0.00	0.00
30	1.52	0.02	0.00	0.15		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	1.75		0.01	0.00		0.00		0.00		0.00	0.10	
Total	6.96	11.01	14.61	9.55	6.77	10.31	1.51	0.27	1.28	0.46	0.23	1.77

Total Rainfall for Water Year 2016: 64.73

Notes:

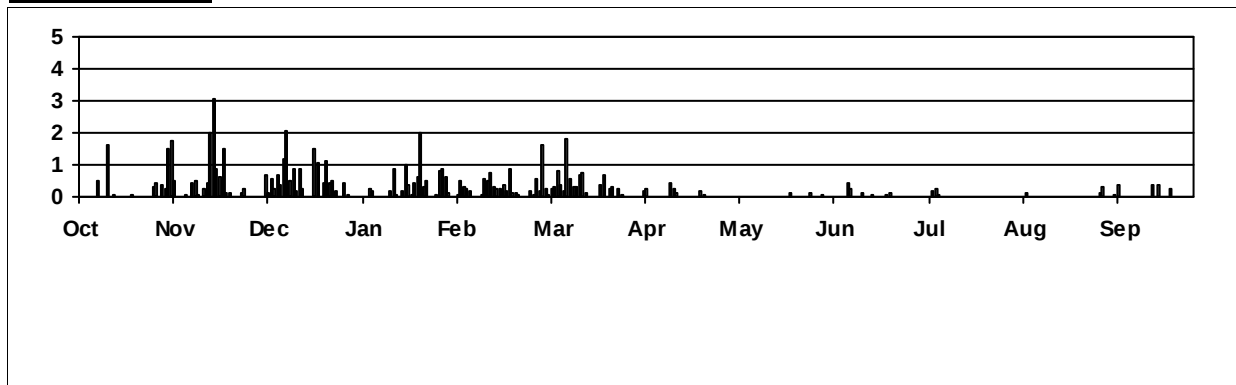
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Annual Hyetograph:



33w--Griffin FS_Rain

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.00	0.00	0.00	0.18	0.04	0.01	0.00	0.19	0.02	0.00	0.14
02	0.00	0.16	0.00	0.02	0.40	0.06	0.00	0.00	0.00	0.00	0.00	0.00
03	0.00	0.51	0.00	0.00	0.11	0.00	0.09	0.00	0.00	0.00	0.00	0.00
04	0.00	0.14	0.10	2.31	0.39	0.00	0.03	0.00	0.00	0.00	0.00	0.00
05	0.00	0.23	0.18	1.23	1.17	0.00	0.00	0.14	0.00	0.00	0.00	0.00
06	0.00	0.54	0.13	0.01	1.12	0.00	0.00	0.00	0.00	0.00	0.00	0.27
07	0.00	0.00	0.00	0.02	1.46	0.00	0.07	0.00	0.00	0.00	0.00	0.00
08	0.00	0.00	0.34	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.03	0.00
09	0.00	0.19	0.71	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.01	0.00
10	0.03	0.00	1.82	0.20	0.02	0.00	0.62	0.00	0.00	0.00	0.00	0.00
11	0.39	0.00	0.62	0.03	0.02	0.25	0.09	0.01	0.00	0.01	0.00	0.00
12	0.00	0.00	0.05	0.00	0.06	0.00	0.03	0.15	0.00	0.00	0.00	0.00
13	0.38	0.00	0.00	0.00	0.00	0.21	0.21	0.12	0.00	0.03	0.00	0.00
14	0.09	0.00	0.00	0.00	0.00	1.12	0.02	0.01	0.00	0.00	0.63	0.00
15	0.26	0.00	0.00	0.64	0.00	2.42	0.00	0.00	0.00	0.00	0.00	0.01
16	0.00	0.00	0.06	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.07
17	0.34	0.00	0.15	1.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19
18	0.10	0.00	0.65	0.46	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
19	0.01	0.00	0.12	0.16	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.38	0.00	2.13	0.00	0.01	0.18	0.00	0.00	0.00	0.00	0.00	0.06
21	0.13	0.93	0.25	0.02	0.01	0.20	0.00	0.00	0.00	0.00	0.00	0.00
22	1.70	0.36	0.00	0.10	0.00	0.14	0.00	0.05	0.00	0.00	0.00	0.00
23	0.62	0.52	0.30	0.47	0.00	0.60	0.12	0.00	0.00	0.00	0.00	0.00
24	0.36	0.40	0.15	0.09	0.00	0.17	0.31	0.00	0.00	0.01	0.00	0.00
25	1.07	1.14	0.00	0.01	0.00	0.45	0.14	0.00	0.00	0.00	0.00	0.21
26	0.28	0.09	0.01	0.00	0.19	0.00	0.01	0.00	0.00	0.15	0.00	0.01
27	0.13	0.65	0.31	0.00	0.41	0.04	0.00	0.00	0.00	0.00	0.00	0.00
28	0.50	0.22	0.12	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.32	0.00
29	0.12	0.01	0.15	0.00		0.00	0.01	0.00	0.00	0.00	1.26	0.00
30	0.60	0.00	0.00	0.00		0.06	0.00	0.00	0.00	0.00	0.52	0.00
31	0.53		0.00	0.00		0.17		0.00		0.00	0.01	
Total	8.02	6.09	8.35	7.19	6.26	6.15	1.76	0.48	0.19	0.22	2.78	0.96

Total Rainfall for Water Year 2015: 48.45

Notes:

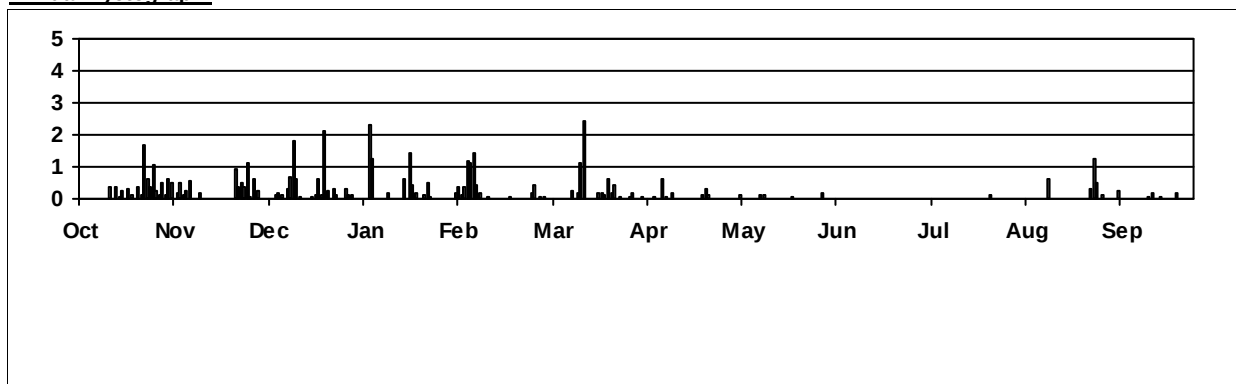
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33w--Griffin FS_Rain

Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.57	0.96	0.00	0.05	2.07	0.00	0.00	0.00	0.00	0.00	0.61
02	0.00	0.10	0.14	0.00	0.04	0.35	0.00	0.00	0.00	0.00	0.00	0.04
03	0.00	0.00	0.69	0.00	0.65	0.07	0.18	0.00	0.00	0.00	0.00	0.00
04	0.00	0.01	0.29	0.27	0.36	0.33	0.27	0.00	0.00	0.00	0.00	0.09
05	0.00	0.08	1.11	0.19	0.31	0.42	0.05	0.00	0.00	0.00	0.00	0.09
06	0.00	0.01	0.69	0.02	0.23	1.13	0.00	0.00	0.00	0.00	0.00	0.41
07	0.62	0.39	1.18	0.03	0.00	0.34	0.00	0.00	0.00	0.20	0.76	0.00
08	0.00	0.52	2.34	0.00	0.00	0.11	0.00	0.00	0.00	0.36	0.00	0.00
09	0.03	0.02	0.64	0.03	0.00	2.62	0.00	0.01	0.26	0.23	0.00	0.00
10	1.30	0.04	1.10	0.00	0.05	0.54	0.00	0.00	0.24	0.00	0.00	0.00
11	0.00	0.25	0.30	0.18	0.44	0.34	0.00	0.00	0.01	0.00	0.01	0.00
12	0.05	0.49	1.07	1.12	0.44	0.56	0.31	0.00	0.00	0.00	0.00	0.00
13	0.00	1.84	0.22	0.05	0.90	0.96	0.26	0.00	0.00	0.00	0.00	0.00
14	0.00	3.32	0.00	0.00	0.37	0.76	0.27	0.00	0.08	0.00	0.00	0.00
15	0.00	0.70	0.03	0.24	0.17	0.05	0.00	0.00	0.08	0.00	0.00	0.00
16	0.00	0.86	0.00	0.97	0.16	0.00	0.00	0.00	0.09	0.00	0.00	0.00
17	0.01	1.80	2.05	0.49	0.29	0.00	0.00	0.00	0.04	0.00	0.00	0.39
18	0.11	0.14	1.13	0.15	0.25	0.00	0.03	0.00	0.05	0.00	0.00	0.00
19	0.05	0.12	0.05	0.39	0.97	0.01	0.00	0.10	0.00	0.00	0.00	0.20
20	0.04	0.00	0.57	0.89	0.14	0.28	0.00	0.02	0.00	0.00	0.00	0.00
21	0.00	0.00	1.29	2.58	0.22	0.83	0.00	0.11	0.00	0.00	0.00	0.00
22	0.00	0.00	0.60	0.28	0.09	0.01	0.25	0.00	0.06	0.00	0.00	0.00
23	0.00	0.14	0.63	0.42	0.00	0.26	0.20	0.12	0.20	0.00	0.00	0.26
24	0.02	0.23	0.18	0.00	0.00	0.46	0.04	0.00	0.01	0.00	0.00	0.00
25	0.39	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.35	0.00	0.00	0.08	0.18	0.28	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.70	0.87	0.10	0.02	0.00	0.00	0.00	0.00	0.00	0.00
28	0.16	0.00	0.02	1.00	0.55	0.00	0.00	0.06	0.00	0.00	0.00	0.00
29	0.25	0.00	0.00	0.75	0.23	0.00	0.00	0.03	0.00	0.00	0.00	0.00
30	1.31	0.00	0.01	0.15		0.00	0.00	0.00	0.00	0.00	0.00	0.02
31	2.17		0.00	0.02		0.00		0.00		0.00	0.08	
Total	6.86	11.63	18.02	11.17	7.19	12.80	1.86	0.45	1.12	0.79	0.85	2.11

Total Rainfall for Water Year 2016: 74.85

Notes:

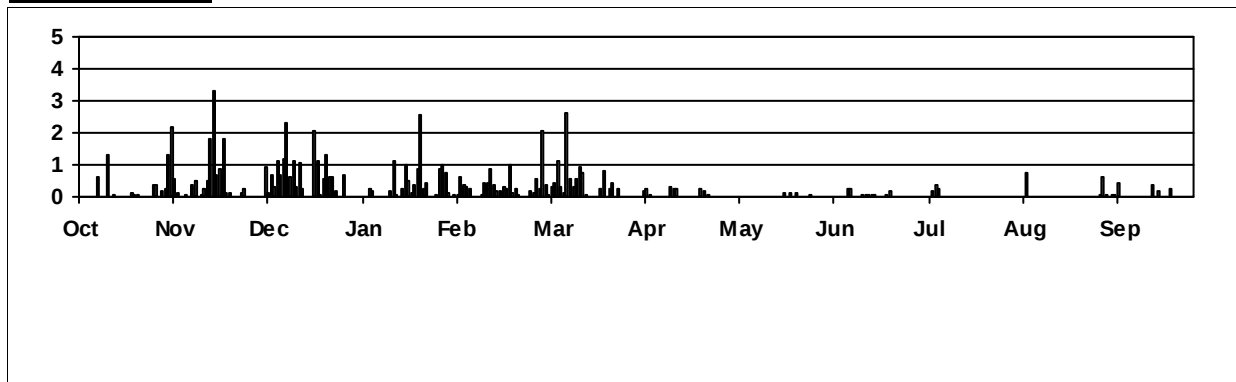
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Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

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Annual Hyetograph:



45u--Littlerock_Rain

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.00	0.00	0.00	0.23	0.00	0.08	0.00	0.17	0.00	0.00	0.31
02	0.00	0.44	0.00	0.13	0.24	0.02	0.01	0.00	0.04	0.00	0.00	0.01
03	0.00	0.69	0.00	0.01	0.02	0.00	0.09	0.00	0.00	0.00	0.00	0.52
04	0.00	0.41	0.06	3.26	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
05	0.00	0.29	0.18	2.73	0.79	0.00	0.01	0.32	0.00	0.00	0.00	0.00
06	0.00	0.53	0.22	0.01	0.91	0.00	0.06	0.00	0.00	0.00	0.00	0.12
07	0.00	0.00	0.01	0.01	1.61	0.00	0.10	0.00	0.00	0.00	0.00	0.00
08	0.01	0.00	0.10	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09	0.00	0.25	0.60	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00
10	0.12	0.00	0.97	0.04	0.12	0.00	0.50	0.00	0.00	0.00	0.00	0.00
11	0.02	0.00	0.54	0.03	0.01	0.21	0.17	0.08	0.00	0.04	0.00	0.00
12	0.00	0.00	0.28	0.01	0.01	0.01	0.01	0.27	0.00	0.00	0.00	0.00
13	0.48	0.00	0.00	0.00	0.00	0.17	0.22	0.09	0.00	0.00	0.00	0.00
14	0.18	0.00	0.00	0.00	0.00	1.72	0.06	0.00	0.00	0.00	1.40	0.00
15	0.63	0.00	0.00	0.39	0.01	1.93	0.00	0.00	0.00	0.00	0.00	0.00
16	0.02	0.00	0.03	0.08	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.18
17	0.24	0.00	0.09	1.66	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.15
18	0.09	0.00	0.44	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.01	0.03	0.04	0.11	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.16	0.08	2.26	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.01
21	0.10	0.80	0.23	0.01	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00
22	1.82	0.41	0.01	0.05	0.01	0.03	0.00	0.01	0.00	0.00	0.00	0.01
23	0.79	0.46	0.34	0.79	0.00	0.67	0.22	0.00	0.00	0.00	0.00	0.00
24	0.32	0.51	0.18	0.30	0.00	0.25	0.43	0.00	0.00	0.00	0.00	0.00
25	0.68	1.23	0.00	0.01	0.01	0.79	0.02	0.00	0.00	0.00	0.00	0.27
26	0.39	0.25	0.03	0.00	0.14	0.01	0.02	0.00	0.00	0.03	0.00	0.00
27	0.07	0.86	0.56	0.02	0.53	0.09	0.03	0.00	0.00	0.00	0.00	0.00
28	0.98	0.33	0.01	0.01	0.00	0.08	0.00	0.00	0.00	0.00	0.28	0.00
29	0.04	0.07	0.15	0.00		0.00	0.01	0.00	0.00	0.00	1.53	0.00
30	0.56	0.00	0.00	0.00		0.03	0.00	0.00	0.00	0.00	0.51	0.00
31	0.51		0.00	0.01		0.15		0.00		0.00	0.11	
Total	8.22	7.64	7.33	9.99	5.82	6.70	2.04	0.77	0.21	0.07	3.83	1.58

Total Rainfall for Water Year 2015: 54.20

Notes:

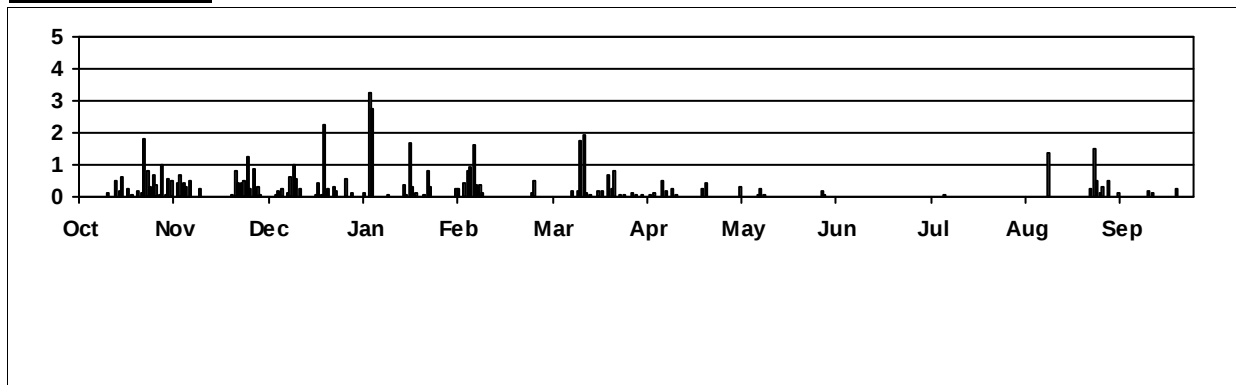
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Thurston County Water Resources Unit

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Annual Hyetograph:



45u--Littlerock_Rain

Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.78	0.89	0.00	0.07	1.84	0.00	0.00	0.04	0.00	0.00	0.35
02	0.00	0.23	0.21	0.01	0.02	0.42	0.00	0.00	0.02	0.00	0.11	0.02
03	0.00	0.00	0.53	0.00	0.42	0.14	0.27	0.00	0.00	0.00	0.00	0.03
04	0.00	0.01	0.48	0.30	0.48	0.24	0.17	0.01	0.00	0.00	0.00	0.00
05	0.00	0.11	0.38	0.16	0.19	0.27	0.04	0.00	0.00	0.00	0.00	0.09
06	0.00	0.01	0.52	0.02	0.12	0.61	0.00	0.00	0.00	0.00	0.00	0.49
07	0.50	0.44	1.05	0.01	0.01	0.32	0.00	0.00	0.00	0.29	0.23	0.00
08	0.00	0.28	3.20	0.00	0.00	0.14	0.00	0.00	0.00	0.41	0.00	0.00
09	0.02	0.00	0.98	0.02	0.00	1.42	0.00	0.00	0.26	0.18	0.00	0.00
10	0.71	0.04	0.90	0.01	0.03	0.52	0.00	0.00	0.26	0.01	0.00	0.00
11	0.00	0.48	0.29	0.20	0.61	0.25	0.00	0.00	0.01	0.00	0.00	0.00
12	0.03	1.22	0.98	0.88	0.75	0.39	0.54	0.00	0.00	0.00	0.00	0.00
13	0.00	3.76	0.49	0.19	0.72	0.60	0.40	0.00	0.06	0.00	0.00	0.00
14	0.00	2.70	0.00	0.01	1.15	1.05	0.10	0.02	0.56	0.00	0.00	0.00
15	0.00	0.59	0.08	0.32	0.29	0.15	0.00	0.03	0.04	0.00	0.00	0.00
16	0.00	1.25	0.04	0.95	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.04	2.60	2.03	0.48	0.39	0.01	0.00	0.00	0.00	0.00	0.00	1.09
18	0.01	0.24	0.75	0.07	0.24	0.00	0.00	0.00	0.02	0.00	0.00	0.01
19	0.05	0.12	0.03	0.57	0.49	0.00	0.00	0.11	0.00	0.00	0.00	0.35
20	0.00	0.00	0.78	0.82	0.17	0.33	0.00	0.00	0.01	0.00	0.00	0.00
21	0.00	0.00	1.12	1.83	0.21	0.70	0.00	0.03	0.00	0.00	0.00	0.00
22	0.00	0.00	0.54	0.19	0.31	0.08	0.41	0.07	0.04	0.45	0.00	0.00
23	0.00	0.14	1.22	0.50	0.00	0.36	0.13	0.00	0.21	0.00	0.00	0.54
24	0.01	0.20	0.25	0.00	0.00	0.43	0.06	0.00	0.01	0.00	0.00	0.00
25	0.34	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
26	1.02	0.00	0.00	0.04	0.20	0.28	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.56	0.52	0.10	0.08	0.02	0.00	0.00	0.00	0.00	0.02
28	0.66	0.01	0.03	1.18	0.57	0.01	0.00	0.05	0.00	0.00	0.00	0.00
29	0.18	0.00	0.00	0.71	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	2.29	0.08	0.00	0.16		0.00	0.00	0.00	0.00	0.00	0.00	0.01
31	2.84		0.00	0.14		0.00		0.00		0.00	0.12	
Total	8.70	15.29	18.33	10.29	8.13	10.65	2.15	0.32	1.54	1.34	0.46	3.00

Total Rainfall for Water Year 2016: 80.20

Notes:

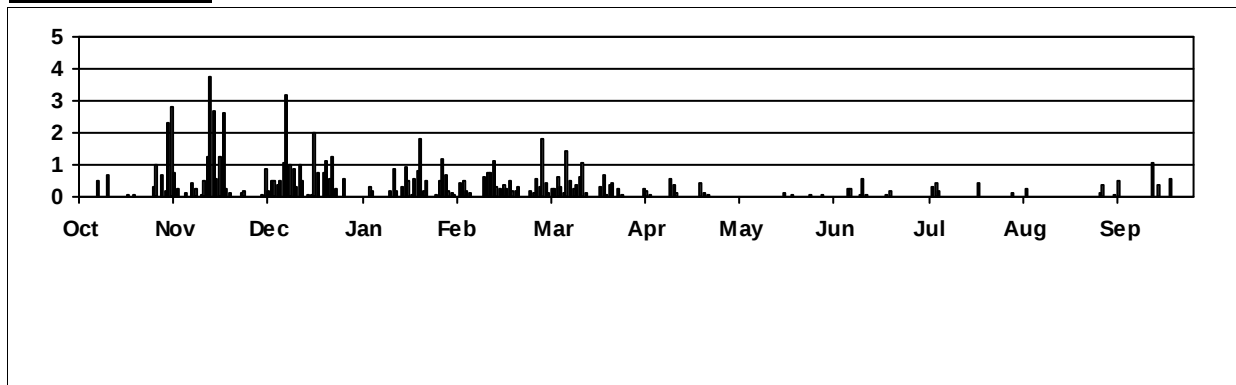
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Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

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Annual Hyetograph:



45w--Rochester Drop Box_Rain

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.00	0.00	0.01	0.15	0.00	0.09	0.00	0.19	0.00	0.00	0.25
02	0.00	0.34	0.00	0.07	0.18	0.02	0.01	0.00	0.03	0.00	0.00	0.02
03	0.00	0.45	0.00	0.02	0.01	0.00	0.10	0.00	0.00	0.00	0.00	0.19
04	0.00	0.24	0.03	2.39	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.01
05	0.00	0.15	0.17	2.14	0.71	0.00	0.05	0.17	0.00	0.00	0.00	0.00
06	0.00	0.59	0.19	0.00	0.80	0.00	0.05	0.01	0.00	0.00	0.00	0.08
07	0.00	0.01	0.02	0.01	1.49	0.00	0.09	0.00	0.00	0.00	0.00	0.00
08	0.00	0.00	0.07	0.00	0.40	0.00	0.02	0.00	0.00	0.00	0.01	0.00
09	0.00	0.21	0.53	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.08	0.00	0.83	0.02	0.10	0.00	0.45	0.00	0.00	0.00	0.00	0.00
11	0.09	0.00	0.47	0.04	0.00	0.16	0.19	0.11	0.00	0.02	0.00	0.00
12	0.00	0.00	0.05	0.00	0.00	0.00	0.05	0.27	0.00	0.00	0.00	0.00
13	0.52	0.00	0.01	0.00	0.00	0.10	0.21	0.14	0.00	0.00	0.00	0.00
14	0.17	0.00	0.00	0.00	0.00	1.24	0.06	0.01	0.00	0.00	0.79	0.00
15	0.48	0.00	0.00	0.35	0.00	1.65	0.00	0.00	0.00	0.00	0.00	0.00
16	0.02	0.00	0.04	0.05	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.15
17	0.18	0.00	0.11	1.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11
18	0.04	0.00	0.38	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.01	0.03	0.03	0.05	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.13	0.05	1.54	0.00	0.01	0.18	0.00	0.00	0.00	0.00	0.00	0.01
21	0.07	0.65	0.14	0.01	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00
22	1.45	0.51	0.00	0.06	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
23	0.72	0.52	0.28	0.65	0.00	0.65	0.21	0.00	0.00	0.00	0.00	0.00
24	0.32	0.26	0.18	0.23	0.00	0.22	0.37	0.00	0.00	0.00	0.00	0.00
25	0.60	1.00	0.00	0.00	0.02	0.55	0.06	0.00	0.00	0.00	0.00	0.28
26	0.46	0.08	0.03	0.00	0.17	0.00	0.05	0.00	0.00	0.04	0.00	0.00
27	0.06	0.59	0.53	0.03	0.43	0.04	0.01	0.00	0.00	0.00	0.00	0.00
28	0.61	0.34	0.01	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.32	0.00
29	0.12	0.10	0.01	0.00		0.00	0.00	0.00	0.00	0.00	1.30	0.00
30	0.54	0.00	0.00	0.00		0.03	0.00	0.00	0.00	0.00	0.85	0.00
31	0.46		0.00	0.00		0.28		0.00		0.00	0.05	
Total	7.13	6.12	5.65	7.89	5.14	5.67	2.07	0.71	0.22	0.06	3.32	1.10

Total Rainfall for Water Year 2015: 45.08

Notes:

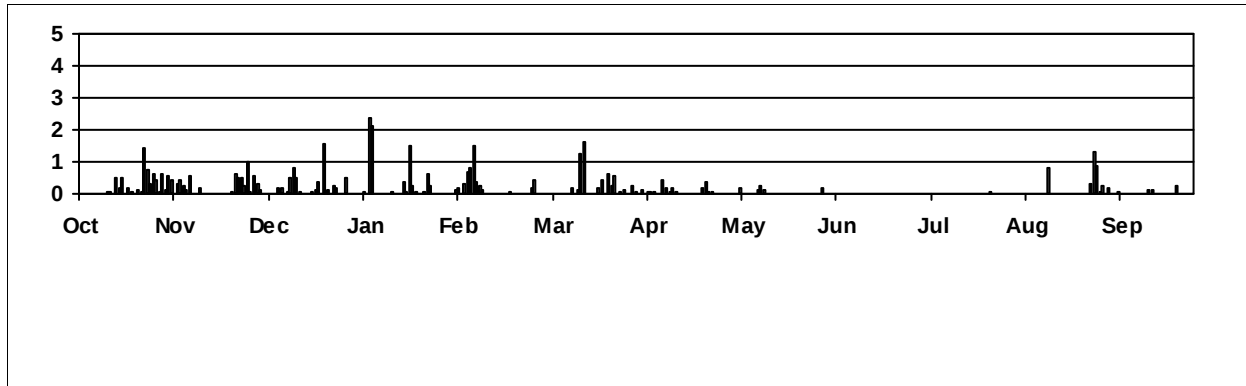
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Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

Visit our website at

Annual Hyetograph:



45w--Rochester Drop Box_Rain

Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.97	0.82	0.01	0.19	1.39	0.00	0.00	0.06	0.00	0.00	0.23
02	0.00	0.20	0.19	0.00	0.00	0.28	0.00	0.00	0.06	0.00	0.10	0.04
03	0.00	0.00	0.47	0.00	0.32	0.08	0.19	0.00	0.00	0.00	0.00	0.02
04	0.00	0.00	0.31	0.15	0.49	0.19	0.09	0.00	0.00	0.00	0.00	0.00
05	0.00	0.15	0.38	0.17	0.22	0.25	0.01	0.00	0.00	0.00	0.00	0.09
06	0.00	0.00	0.46	0.01	0.07	0.54	0.00	0.00	0.00	0.00	0.00	0.47
07	0.50	0.32	0.90	0.03	0.00	0.30	0.00	0.00	0.00	0.27	0.35	0.00
08	0.00	0.28	2.32	0.00	0.00	0.14	0.00	0.00	0.00	0.24	0.01	0.01
09	0.01	0.01	0.54	0.01	0.00	1.18	0.00	0.00	0.05	0.16	0.00	0.00
10	0.61	0.01	0.79	0.00	0.01	0.36	0.00	0.00	0.35	0.00	0.00	0.00
11	0.00	0.39	0.23	0.13	0.51	0.22	0.00	0.00	0.08	0.00	0.00	0.00
12	0.03	0.58	0.79	0.78	0.48	0.30	0.37	0.00	0.00	0.00	0.00	0.00
13	0.00	2.18	0.35	0.17	0.59	0.62	0.32	0.00	0.07	0.00	0.00	0.00
14	0.00	2.35	0.00	0.00	0.91	0.89	0.08	0.01	0.72	0.00	0.00	0.00
15	0.00	0.55	0.08	0.21	0.22	0.15	0.00	0.07	0.00	0.00	0.00	0.00
16	0.00	0.83	0.05	0.70	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.05	1.70	1.70	0.42	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.93
18	0.15	0.25	0.85	0.06	0.20	0.00	0.00	0.00	0.01	0.00	0.00	0.01
19	0.10	0.09	0.03	0.48	0.34	0.00	0.00	0.35	0.00	0.00	0.00	0.15
20	0.00	0.00	0.72	0.66	0.10	0.34	0.00	0.00	0.01	0.00	0.00	0.01
21	0.00	0.01	0.89	1.43	0.21	0.49	0.00	0.03	0.00	0.00	0.00	0.00
22	0.00	0.00	0.38	0.16	0.14	0.09	0.31	0.19	0.03	0.34	0.00	0.00
23	0.00	0.16	1.09	0.45	0.00	0.36	0.13	0.00	0.32	0.00	0.00	0.30
24	0.01	0.18	0.28	0.01	0.00	0.38	0.09	0.00	0.06	0.00	0.00	0.00
25	0.32	0.01	0.02	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
26	0.85	0.00	0.00	0.01	0.28	0.10	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.37	0.39	0.07	0.09	0.00	0.00	0.00	0.00	0.00	0.02
28	0.52	0.00	0.03	1.02	0.31	0.00	0.00	0.06	0.00	0.00	0.00	0.00
29	0.24	0.00	0.00	0.66	0.32	0.00	0.00	0.01	0.00	0.00	0.00	0.00
30	1.62	0.04	0.00	0.12		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	2.05		0.00	0.06		0.00		0.00		0.00	0.16	
Total	7.06	11.26	15.04	8.30	6.49	8.78	1.59	0.72	1.82	1.01	0.62	2.28

Total Rainfall for Water Year 2016: 64.97

Notes:

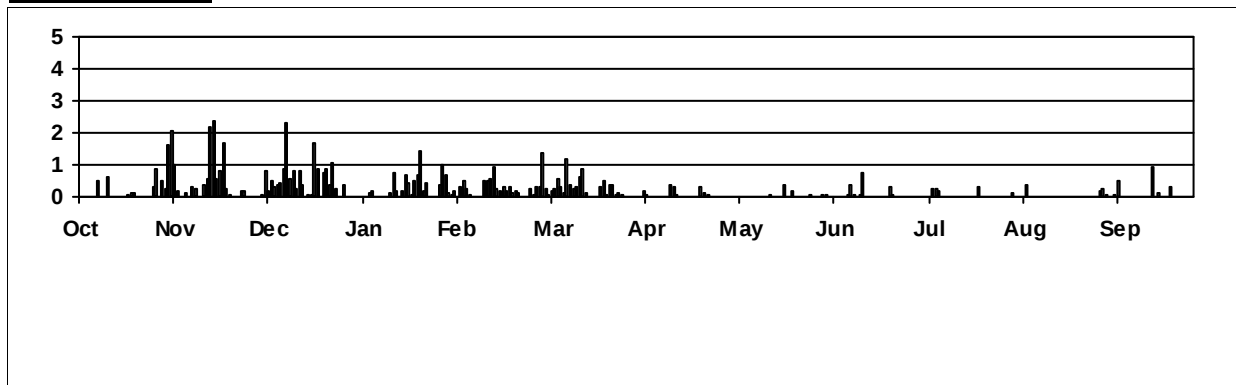
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Precipitation from snow is not measured accurately

Thurstun County Water Resources Unit

Visit our website at

Annual Hyetograph:



55u--Tenino_Rain

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.01	0.00	0.00	0.07	0.00	0.32	0.00	0.21	0.00	0.00	0.36
02	0.00	0.21	0.00	0.05	0.23	0.03	0.00	0.00	0.08	0.00	0.00	0.29
03	0.00	0.62	0.00	0.01	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.27
04	0.00	0.21	0.01	2.49	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00
05	0.00	0.19	0.16	1.77	0.91	0.00	0.01	0.24	0.00	0.00	0.00	0.00
06	0.00	0.52	0.17	0.00	1.04	0.00	0.03	0.00	0.00	0.00	0.00	0.03
07	0.00	0.01	0.00	0.00	1.38	0.00	0.08	0.00	0.00	0.00	0.00	0.00
08	0.00	0.00	0.09	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09	0.00	0.24	0.57	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.04	0.00	0.85	0.02	0.06	0.00	0.52	0.00	0.00	0.00	0.00	0.00
11	0.11	0.01	0.47	0.03	0.00	0.16	0.16	0.06	0.00	0.00	0.00	0.00
12	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.00	0.00
13	0.63	0.00	0.01	0.00	0.00	0.10	0.19	0.15	0.00	0.00	0.00	0.00
14	0.28	0.00	0.00	0.00	0.00	1.31	0.08	0.01	0.00	0.00	0.59	0.00
15	0.12	0.00	0.00	0.41	0.00	1.95	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.02	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.09
17	0.12	0.00	0.06	1.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
18	0.06	0.00	0.42	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.01	0.02	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.01
20	0.43	0.04	1.60	0.00	0.01	0.09	0.00	0.00	0.00	0.00	0.00	0.04
21	0.08	0.56	0.22	0.01	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00
22	1.27	0.43	0.01	0.04	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
23	0.76	0.55	0.34	0.47	0.00	0.56	0.09	0.00	0.00	0.00	0.00	0.00
24	0.31	0.31	0.21	0.18	0.00	0.33	0.27	0.00	0.00	0.00	0.00	0.00
25	0.38	1.23	0.00	0.00	0.11	0.33	0.10	0.00	0.00	0.00	0.00	0.30
26	0.30	0.08	0.01	0.00	0.19	0.00	0.01	0.00	0.00	0.10	0.00	0.01
27	0.02	0.85	0.47	0.01	0.77	0.07	0.01	0.00	0.00	0.00	0.00	0.00
28	0.45	0.48	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00
29	0.21	0.10	0.01	0.00		0.00	0.01	0.00	0.00	0.00	1.38	0.00
30	0.75	0.01	0.00	0.01		0.04	0.00	0.00	0.00	0.00	1.06	0.00
31	0.58		0.00	0.00		0.25		0.00		0.00	0.16	
Total	6.90	6.67	5.75	7.28	5.74	5.48	1.99	0.97	0.29	0.10	3.32	1.49

Total Rainfall for Water Year 2015: 45.98

Notes:

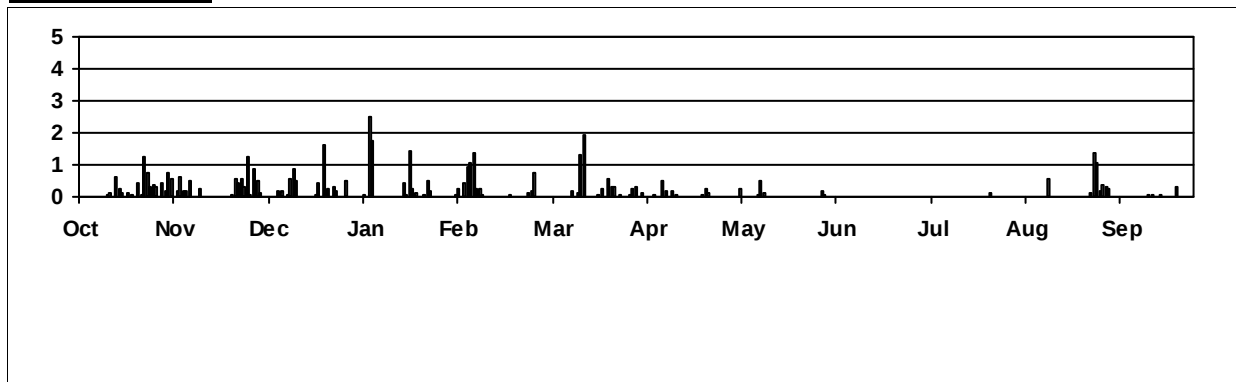
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Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

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Annual Hyetograph:



55u--Tenino_Rain

Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.79	0.56	0.00	0.25	1.30	0.00	0.00	0.04	0.00	0.00	0.24
02	0.00	0.15	0.08	0.00	0.01	0.29	0.00	0.00	0.04	0.00	0.07	0.02
03	0.00	0.00	0.52	0.00	0.19	0.06	0.26	0.00	0.00	0.00	0.00	0.00
04	0.00	0.00	0.33	0.41	0.42	0.12	0.13	0.00	0.00	0.00	0.00	0.02
05	0.00	0.14	0.14	0.10	0.17	0.14	0.02	0.00	0.00	0.00	0.00	0.07
06	0.00	0.00	0.44	0.00	0.12	0.48	0.00	0.00	0.00	0.00	0.00	0.35
07	0.47	0.34	0.88	0.00	0.00	0.55	0.00	0.00	0.00	0.22	0.20	0.00
08	0.00	0.15	2.23	0.01	0.00	0.14	0.00	0.00	0.00	0.45	0.00	0.00
09	0.02	0.04	0.53	0.00	0.00	0.77	0.00	0.00	0.04	0.11	0.00	0.00
10	0.43	0.01	1.15	0.00	0.04	0.28	0.00	0.00	0.28	0.00	0.00	0.00
11	0.00	0.31	0.10	0.05	0.33	0.18	0.00	0.00	0.02	0.00	0.00	0.00
12	0.06	0.39	0.68	0.49	0.55	0.32	0.43	0.00	0.00	0.00	0.00	0.00
13	0.02	2.08	0.35	0.21	0.66	0.45	0.30	0.00	0.10	0.00	0.00	0.00
14	0.00	2.54	0.00	0.01	0.74	0.99	0.25	0.02	0.45	0.00	0.00	0.00
15	0.00	0.79	0.02	0.16	0.13	0.15	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.57	0.04	0.58	0.17	0.01	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	1.86	1.43	0.39	0.35	0.00	0.00	0.00	0.03	0.00	0.00	0.64
18	0.14	0.11	1.17	0.12	0.15	0.00	0.00	0.00	0.06	0.00	0.00	0.01
19	0.14	0.10	0.12	0.51	0.32	0.01	0.00	0.26	0.00	0.00	0.00	0.24
20	0.04	0.01	0.58	0.53	0.02	0.19	0.00	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	1.14	0.83	0.15	0.38	0.00	0.06	0.00	0.00	0.00	0.00
22	0.00	0.00	0.31	0.22	0.17	0.04	0.22	0.04	0.01	0.04	0.00	0.00
23	0.00	0.16	1.56	0.56	0.01	0.25	0.24	0.00	0.36	0.00	0.00	0.07
24	0.00	0.20	0.40	0.00	0.00	0.27	0.03	0.00	0.08	0.00	0.00	0.00
25	0.31	0.00	0.05	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
26	0.69	0.00	0.00	0.02	0.30	0.11	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.01	0.42	0.39	0.17	0.11	0.00	0.00	0.00	0.00	0.00	0.02
28	0.27	0.00	0.04	1.19	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.39	0.00	0.01	0.54	0.22	0.00	0.02	0.00	0.00	0.00	0.00	0.00
30	1.69	0.02	0.00	0.22		0.00	0.01	0.00	0.00	0.00	0.00	0.00
31	2.67		0.01	0.08		0.00		0.00		0.00	0.12	
Total	7.34	10.77	15.29	7.62	6.02	7.60	1.91	0.38	1.51	0.82	0.39	1.68

Total Rainfall for Water Year 2016: 61.33

Notes:

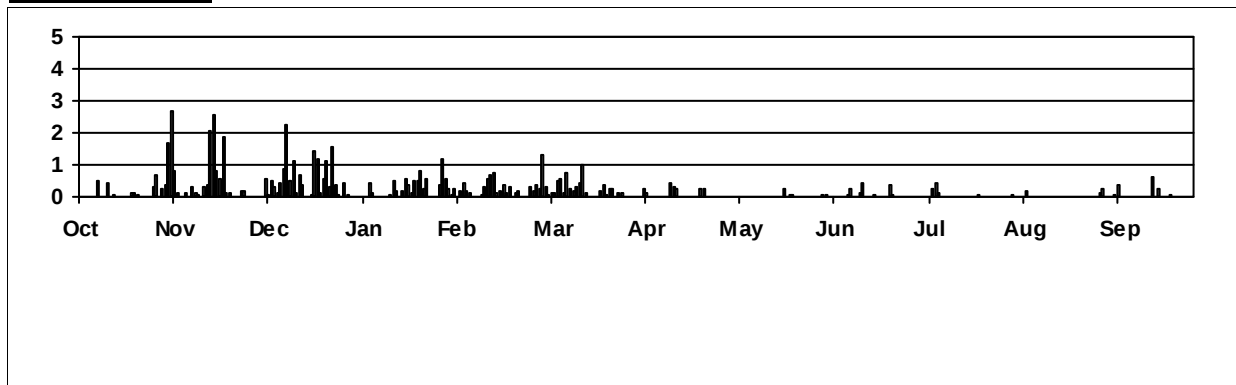
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Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

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Annual Hyetograph:



59u--Bloody Run USGS_Rain

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.00	0.00	0.14	0.11	0.00	0.21	0.00	0.26	0.00	0.00	0.30
02	0.00	0.19	0.00	0.17	0.14	0.01	0.00	0.00	0.30	0.00	0.00	0.01
03	0.00	0.36	0.00	0.03	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.47
04	0.00	0.08	0.02	0.02	0.28	0.00	0.00	0.11	0.00	0.00	0.00	0.01
05	0.00	0.15	0.10	1.32	0.61	0.00	0.00	0.26	0.00	0.00	0.00	0.00
06	0.00	0.61	0.16	0.00	0.76	0.00	0.01	0.03	0.00	0.00	0.00	0.04
07	0.00	0.00	0.00	0.00	0.75	0.00	0.08	0.00	0.00	0.00	0.00	0.00
08	0.00	0.00	0.04	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09	0.00	0.18	0.51	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.01	0.62	0.01	0.16	0.00	0.32	0.00	0.00	0.00	0.01	0.00
11	0.15	0.00	0.26	0.00	0.00	0.05	0.67	0.13	0.00	0.00	0.00	0.00
12	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.31	0.00	0.00	0.00	0.00
13	0.36	0.00	0.00	0.00	0.00	0.02	0.30	0.24	0.00	0.00	0.00	0.00
14	0.38	0.00	0.00	0.00	0.00	1.14	0.13	0.01	0.00	0.00	0.46	0.00
15	0.34	0.00	0.00	0.25	0.00	1.37	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.06	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.01
17	0.04	0.00	0.05	1.07	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.07
18	0.11	0.00	0.33	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.01	0.02	0.23	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.18	0.02	0.91	0.00	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.06
21	0.06	0.58	0.11	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00
22	0.90	0.44	0.05	0.03	0.00	0.09	0.00	0.03	0.00	0.00	0.00	0.00
23	0.75	0.69	0.02	0.45	0.00	0.59	0.08	0.00	0.00	0.00	0.00	0.00
24	0.28	0.10	0.01	0.20	0.00	0.25	0.23	0.00	0.00	0.00	0.00	0.00
25	0.20	0.89	0.00	0.00	0.05	0.16	0.11	0.00	0.00	0.02	0.00	0.22
26	0.26	0.00	0.02	0.00	0.11	0.00	0.01	0.00	0.00	0.08	0.00	0.00
27	0.00	0.38	0.01	0.02	1.03	0.08	0.00	0.00	0.00	0.00	0.00	0.00
28	0.14	0.43	0.01	0.00	0.00	0.09	0.04	0.00	0.00	0.00	0.01	0.00
29	0.17	0.15	0.02	0.00		0.00	0.04	0.00	0.00	0.00	0.92	0.00
30	0.64	0.00	0.01	0.00		0.01	0.00	0.00	0.00	0.00	0.64	0.00
31	0.69		0.03	0.00		0.18		0.00		0.00	0.08	
Total	5.65	5.27	3.32	4.43	4.45	4.41	2.37	1.12	0.56	0.10	2.12	1.19

Total Rainfall for Water Year 2015: 34.99

Notes:

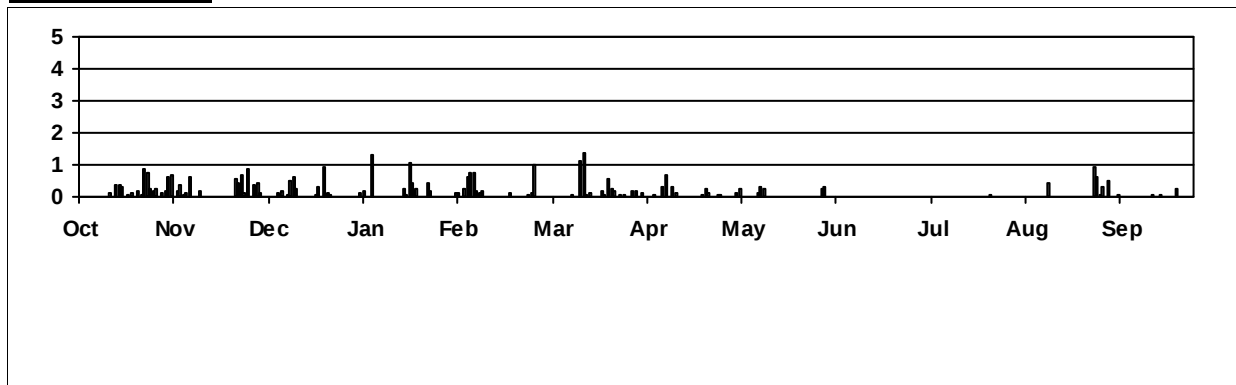
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Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

Visit our website at

Annual Hyetograph:



59u--Bloody Run USGS_Rain

Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	1.06	0.42	0.00	0.01	0.93	0.00	0.00	0.02	0.00	0.00	0.18
02	0.00	0.11	0.07	0.00	0.00	0.14	0.00	0.00	0.17	0.00	0.02	0.02
03	0.03	0.00	0.56	0.05	0.18	0.06	0.20	0.00	0.00	0.00	0.00	0.00
04	0.00	0.00	0.28	0.44	0.29	0.06	0.34	0.00	0.00	0.00	0.00	0.00
05	0.00	0.08	0.20	0.07	0.15	0.18	0.05	0.00	0.00	0.00	0.00	0.04
06	0.00	0.00	0.24	0.00	0.11	0.33	0.00	0.00	0.00	0.00	0.00	0.32
07	0.44	0.17	1.01	0.10	0.00	0.28	0.00	0.00	0.00	0.16	0.07	0.01
08	0.00	0.13	2.12	0.00	0.00	0.05	0.00	0.00	0.00	0.18	0.01	0.00
09	0.01	0.07	0.53	0.00	0.00	0.67	0.00	0.00	0.01	0.13	0.00	0.00
10	0.31		0.85	0.00	0.01	0.32	0.00	0.00	0.27	0.04	0.00	0.00
11	0.00		0.05	0.07	0.25	0.41	0.00	0.00	0.19	0.00	0.00	0.00
12	0.00		0.31	0.42	0.36	0.36	0.46	0.00	0.00	0.14	0.00	0.00
13	0.01		0.30	0.42	0.57	0.35	0.24	0.00	0.21	0.00	0.00	0.00
14	0.00		0.00	0.00	0.93	0.86	0.39	0.03	0.64	0.00	0.00	0.00
15	0.00		0.00	0.02	0.09	0.07	0.00	0.09	0.02	0.00	0.00	0.00
16	0.00	0.44	0.03	0.43	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	1.92	1.16	0.33	0.52	0.00	0.00	0.00	0.07	0.00	0.00	0.53
18	0.10	0.07	0.88	0.10	0.11	0.00	0.00	0.00	0.10	0.00	0.00	0.00
19	0.02	0.08	0.16	0.51	0.52	0.00	0.00	0.47	0.00	0.00	0.00	0.44
20	0.01	0.00	0.41	0.33	0.01	0.12	0.00	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.73	0.62	0.11	0.23	0.00	0.17	0.00	0.00	0.00	0.00
22	0.00	0.00	0.34	0.42	0.06	0.14	0.14	0.12	0.00	0.01	0.00	0.00
23	0.00	0.14	1.77	0.65	0.00	0.15	0.29	0.01	0.35	0.00	0.00	0.01
24	0.00	0.21	0.17	0.00	0.00	0.23	0.11	0.00	0.10	0.00	0.00	0.00
25	0.17	0.00	0.00	0.00	0.00	0.08	0.01	0.00	0.00	0.00	0.00	0.00
26	0.51	0.00	0.00	0.05	0.25	0.12	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.16	0.22	0.30	0.16	0.01	0.00	0.00	0.00	0.00	0.01
28	0.22	0.00	0.06	0.71	0.26	0.00	0.10	0.01	0.00	0.00	0.00	0.00
29	0.08	0.00	0.01	0.30	0.12	0.00	0.00	0.02	0.00	0.00	0.00	0.00
30	1.48	0.01	0.00	0.26		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	3.17		0.00	0.01		0.00		0.00		0.00	0.03	
Total	6.56	4.49	12.82	6.53	5.31	6.30	2.34	0.92	2.15	0.66	0.13	1.56

Total Rainfall for Water Year 2016: 49.77

Precipitation is measured with a tipping bucket rain gauge. Ice and snow accumulations in the rain gauge are not measured until they melt.

Precipitation from snow is not measured accurately

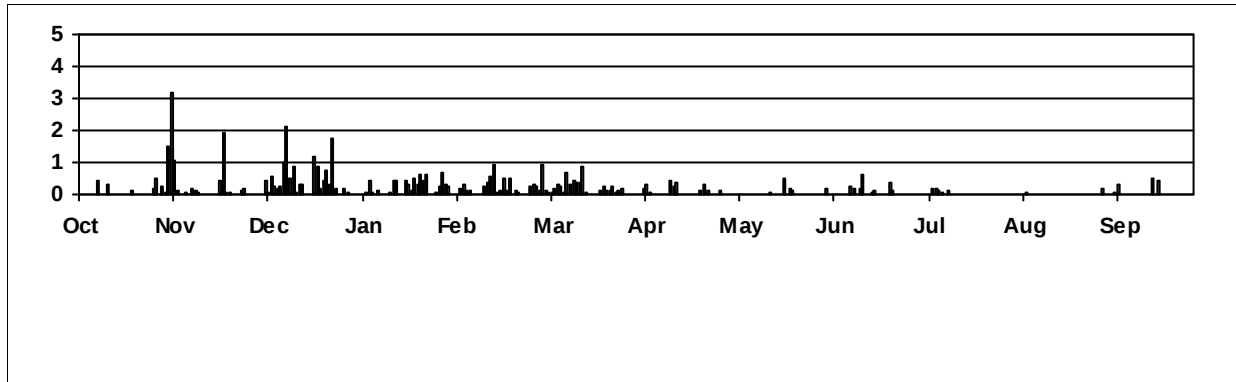
Thurston County Water Resources Unit

Notes:

Nov: Equipment failure; funnel clogged with leaves also.

Visit our website at

Annual Hyetograph:



60u--Bucoda USGS_Rain

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.00	0.00	0.00	0.13 e	0.00	0.19 e	0.00	0.22	0.00	0.00	0.07
02	0.00	0.24	0.00	0.04	0.15 e	0.03	0.00 e	0.00	0.18	0.00	0.00	0.01
03	0.00	0.33	0.00	0.00	0.00 e	0.00	0.13 e	0.00	0.00	0.00	0.00	0.65
04	0.00	0.08	0.04	1.09	0.38	0.00	0.00 e	0.00	0.00	0.00	0.00	0.00
05	0.00	0.19	0.19	2.51	0.65	0.00	0.00 e	0.42	0.00	0.00	0.00	0.00
06	0.00	0.48	0.12	0.00	0.58	0.00	0.01 e	0.04	0.00	0.00	0.00	0.09
07	0.00	0.00	0.00	0.00	1.12	0.00	0.09 e	0.00	0.00	0.00	0.00	0.00
08	0.00	0.00	0.04	0.00	0.42	0.00	0.00 e	0.00	0.00	0.00	0.00	0.00
09	0.00	0.19	0.45	0.00	0.14	0.00	0.00 e	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.75	0.00	0.01	0.00	0.30 e	0.00	0.00	0.00	0.00	0.00
11	0.17	0.00	0.43	0.06	0.00	0.14	0.64 e	0.15	0.00	0.03	0.00	0.00
12	0.01	0.00	0.01	0.00	0.00	0.00	0.02 e	0.69	0.00	0.00	0.00	0.00
13	0.36	0.00	0.01	0.00	0.00	0.03	0.37 e	0.15	0.00	0.00	0.00	0.00
14	0.37	0.00	0.00	0.00	0.00	1.05	0.24 e	0.02	0.00	0.00	0.54	0.00
15	0.19	0.00	0.00	0.00	0.00	1.64	0.00 e	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.02	0.05 e	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.08
17	0.14	0.00	0.08	1.31 e	0.00	0.08 e	0.00	0.00	0.00	0.00	0.00	0.15
18	0.01	0.00	0.37	0.09 e	0.00	0.00 e	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.04	0.04	0.08 e	0.25	0.00 e	0.00	0.00	0.00	0.00	0.00	0.00
20	0.33	0.02	0.86	0.00 e	0.01	0.11 e	0.00	0.00	0.00	0.00	0.00	0.02
21	0.13	0.50	0.32	0.00 e	0.00	0.24 e	0.00	0.00	0.00	0.00	0.00	0.00
22	1.03	0.46	0.01	0.04 e	0.00	0.07 e	0.00	0.01	0.00	0.00	0.00	0.00
23	1.09	0.75	0.35	0.45 e	0.00	0.54 e	0.05	0.02	0.00	0.00	0.00	0.00
24	0.36	0.13	0.26	0.22 e	0.00	0.30 e	0.23	0.00	0.00	0.00	0.00	0.00
25	0.29	0.79	0.00	0.00 e	0.08	0.16 e	0.21	0.01	0.00	0.00	0.00	0.29
26	0.33	0.06	0.01	0.00 e	0.29	0.00 e	0.02	0.00	0.00	0.09	0.00	0.00
27	0.00	0.36	0.52	0.01 e	0.91	0.10 e	0.01	0.00	0.00	0.00	0.00	0.00
28	0.22	0.43	0.01	0.00 e	0.00	0.09 e	0.01	0.00	0.00	0.00	0.20	0.00
29	0.13	0.18	0.00	0.00 e		0.00 e	0.07	0.00	0.00	0.00	1.06	0.00
30	0.60	0.00	0.00	0.00 e		0.01 e	0.00	0.00	0.00	0.00	0.70	0.00
31	0.74		0.00	0.00 e		0.19 e		0.00		0.00	0.15	
Total	6.50	5.23	4.89	5.95	5.12	4.82	2.60	1.51	0.40	0.12	2.65	1.36

Total Rainfall for Water Year 2015: 41.15

Precipitation is measured with a tipping bucket rain gauge. Ice and snow accumulations in the rain gauge are not measured until they melt.

Precipitation from snow is not measured accurately

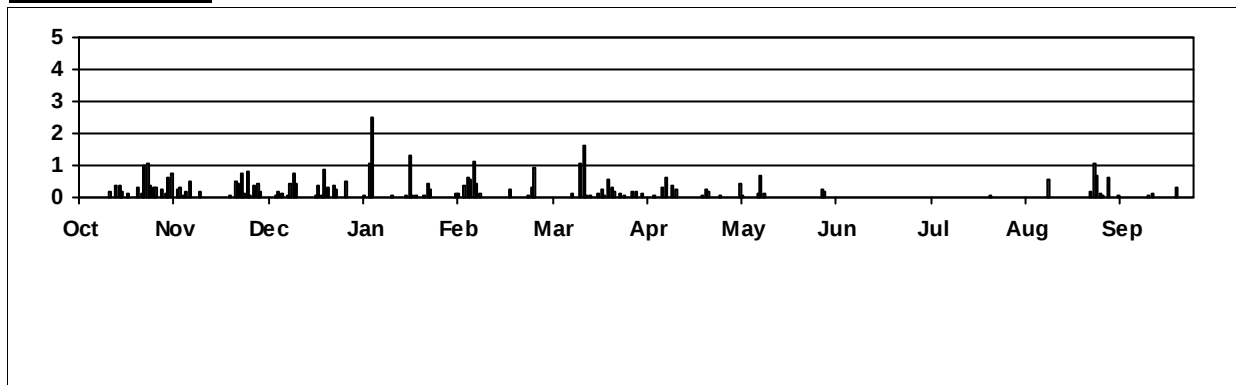
Thurston County Water Resources Unit

Notes:

January 18 to 31, and February 1 to 3, data logger failed to record.

Visit our website at

Annual Hyetograph:



60u--Bucoda USGS_Rain

Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.77	0.67	0.00	0.09	1.09	0.00	0.00	0.03	0.00	0.00	0.19
02	0.00	0.39	0.10	0.00	0.01	0.30	0.00	0.00	0.06	0.00	0.12	0.04
03	0.01	0.22	0.61	0.00	0.18	0.07	0.21	0.00	0.00	0.00	0.00	0.00
04	0.00	0.16	0.32	0.48	0.33	0.17	0.16	0.00	0.00	0.00	0.00	0.00
05	0.00	0.16	0.08	0.16	0.11	0.19	0.03	0.00	0.00	0.00	0.00	0.10
06	0.00	0.08	0.41	0.00	0.06	0.51	0.00	0.00	0.00	0.00	0.00	0.63
07	0.53	0.26	1.00	0.01	0.00	0.20	0.00	0.00	0.01	0.22	0.05	0.01
08	0.00	0.15	1.78	0.00	0.00	0.07	0.00	0.00	0.00	0.13	0.37	0.00
09	0.01	0.04	0.44	0.02	0.00	0.84	0.00	0.00	0.04	0.03	0.00	0.00
10	0.60	0.00	1.27	0.00	0.00	0.18	0.00	0.00	0.20	0.02	0.00	0.00
11	0.00	0.24	0.18	0.13	0.39	0.19	0.00	0.00	0.19	0.01	0.00	0.00
12	0.01	0.07	0.43	0.60	0.48	0.28	0.38	0.00	0.00	0.00	0.00	0.00
13	0.01	1.58	0.34	0.22	0.68	0.51	0.24	0.00	0.16	0.00	0.00	0.00
14	0.00	2.21	0.00	0.00	0.79	0.74	0.14	0.02	0.21	0.00	0.00	0.00
15	0.00	0.66	0.01	0.15	0.09	0.12	0.00	0.04	0.06	0.00	0.00	0.00
16	0.00	0.47	0.03	0.53	0.09	0.00	0.00	0.00	0.03	0.00	0.00	0.00
17	0.02	1.33	1.25	0.43	0.38	0.00	0.00	0.00	0.02	0.00	0.00	0.63
18	0.04	0.16	1.02	0.09	0.17	0.00	0.00	0.00	0.01	0.00	0.00	0.00
19	0.13	0.10	0.11	0.61	0.32	0.01	0.00	0.52	0.02	0.00	0.00	0.21
20	0.00	0.00	0.33	0.63	0.01	0.24	0.02	0.00	0.07	0.00	0.00	0.00
21	0.00	0.00	0.98	0.86	0.11	0.42	0.00	0.13	0.10	0.00	0.00	0.00
22	0.00	0.00	0.24	0.18	0.08	0.15	0.63	0.06	0.05	0.02	0.00	0.00
23	0.00	0.16	1.29	0.66	0.00	0.19	0.14	0.00	0.10	0.00	0.00	0.06
24	0.01	0.15	0.16	0.00	0.00	0.16	0.07	0.00	0.11	0.00	0.00	0.00
25	0.36	0.00	0.00	0.00	0.00	0.04	0.04	0.00	0.10	0.00	0.00	0.00
26	0.52	0.00	0.00	0.00	0.36	0.07	0.00	0.00	0.06	0.00	0.00	0.00
27	0.00	0.00	0.32	0.34	0.16	0.06	0.00	0.00	0.00	0.00	0.00	0.01
28	0.36	0.00	0.02	0.79	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.20	0.00	0.04	0.40	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	1.10	0.01	0.00	0.21		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	1.55		0.00	0.03		0.00		0.00		0.00	0.10	
Total	5.46	9.37	13.43	7.53	5.39	6.80	2.06	0.77	1.63	0.43	0.64	1.88

Total Rainfall for Water Year 2016: 55.39

Precipitation is measured with a tipping bucket rain gauge. Ice and snow accumulations in the rain gauge are not measured until they melt.

Precipitation from snow is not measured accurately

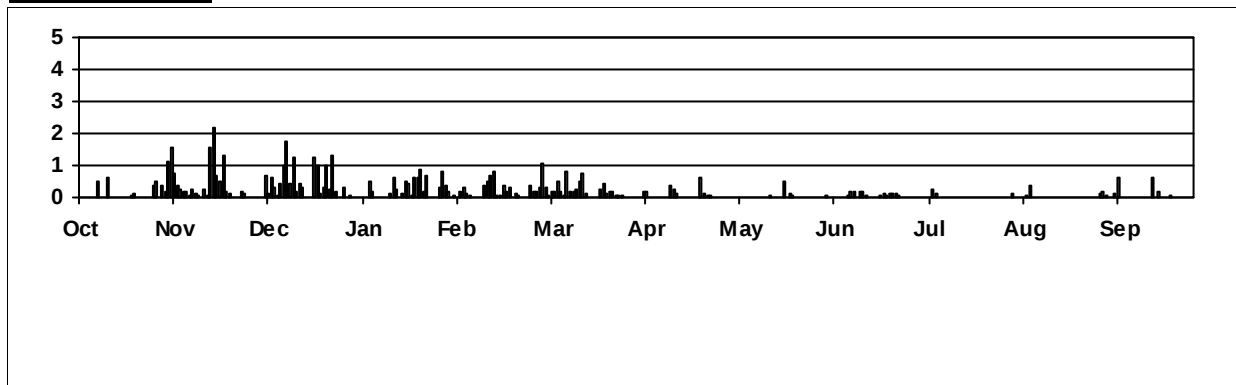
Thurston County Water Resources Unit

Notes:

Nov: Funnel clogged with leaves.

Visit our website at

Annual Hyetograph:



65u--Grand Mound_Rain

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.00	0.00	0.00	0.16	0.00	0.09	0.00	0.22	0.00	0.00	0.17
02	0.00	0.28	0.00	0.07	0.15	0.02	0.08	0.00	0.04	0.00	0.00	0.04
03	0.00	0.34	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.52
04	0.00	0.12	0.03	2.25	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
05	0.00	0.18	0.16	1.87	0.71	0.00	0.07	0.37	0.00	0.00	0.00	0.00
06	0.00	0.49	0.12	0.00	0.92	0.00	0.04	0.00	0.00	0.00	0.00	0.06
07	0.00	0.01	0.01	0.01	1.30	0.00	0.08	0.00	0.00	0.00	0.00	0.00
08	0.00	0.00	0.03	0.00	0.39	0.00	0.04	0.00	0.00	0.00	0.00	0.00
09	0.00	0.18	0.43	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.03	0.00	0.97	0.04	0.03	0.00	0.41	0.00	0.00	0.00	0.00	0.00
11	0.17	0.00	0.61	0.02	0.00	0.11	0.21	0.11	0.00	0.03	0.00	0.00
12	0.01	0.00	0.07	0.00	0.01	0.01	0.08	0.36	0.00	0.00	0.00	0.00
13	0.46	0.00	0.01	0.00	0.00	0.10	0.17	0.09	0.00	0.00	0.00	0.00
14	0.19	0.00	0.00	0.00	0.00	1.25	0.11	0.00	0.00	0.00	0.80	0.00
15	0.12	0.00	0.00	0.40	0.00	1.46	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.04	0.04	0.00	0.01	0.00	0.04	0.00	0.00	0.00	0.15
17	0.15	0.00	0.11	1.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
18	0.04	0.00	0.42	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.01	0.02	0.04	0.22	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.11	0.03	1.21	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.05
21	0.15	0.62	0.11	0.01	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00
22	1.29	0.45	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.99	0.74	0.36	0.49	0.00	0.58	0.09	0.00	0.00	0.00	0.00	0.00
24	0.35	0.19	0.22	0.20	0.00	0.15	0.26	0.00	0.00	0.00	0.00	0.00
25	0.60	0.81	0.00	0.00	0.05	0.35	0.04	0.00	0.00	0.00	0.00	0.27
26	0.31	0.04	0.02	0.01	0.15	0.00	0.03	0.00	0.00	0.00	0.00	0.00
27	0.05	0.51	0.43	0.00	0.52	0.02	0.00	0.00	0.00	0.00	0.00	0.00
28	0.50	0.38	0.02	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.23	0.00
29	0.16	0.15	0.02	0.00		0.00	0.06	0.00	0.00	0.00	1.27	0.00
30	0.67	0.00	0.00	0.01		0.02	0.00	0.00	0.00	0.00	0.71	0.00
31	0.48		0.00	0.00		0.21		0.00		0.00	0.07	
Total	6.84	5.54	5.44	7.28	5.10	4.65	2.06	0.97	0.26	0.03	3.08	1.33

Total Rainfall for Water Year 2015: 42.58

Notes:

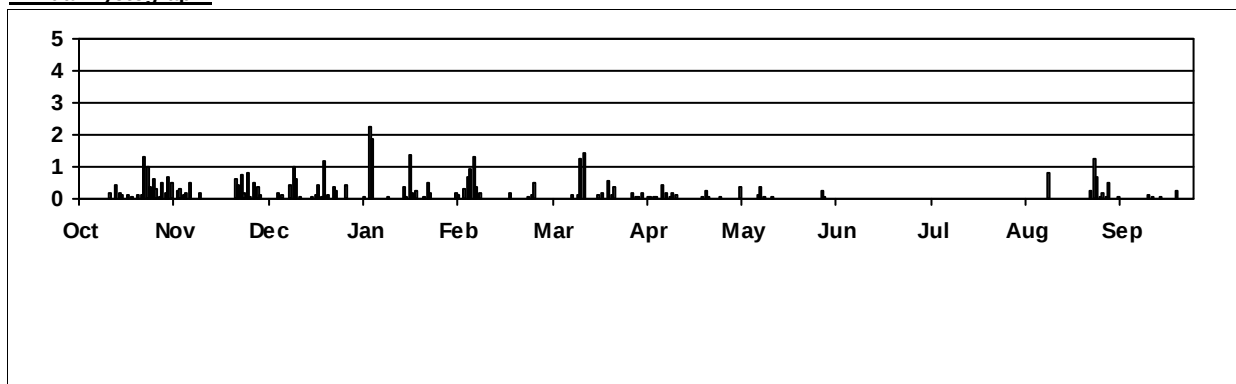
Precipitation is measured with a tipping bucket rain gauge. Ice and snow accumulations in the rain gauge are not measured until they melt.

Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

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Annual Hyetograph:



65u--Grand Mound_Rain

Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.67	0.71	0.00	0.21	1.30	0.00	0.00	0.02	0.00	0.00	0.32
02	0.00	0.17	0.11	0.00	0.00	0.26	0.00	0.00	0.02	0.00	0.08	0.01
03	0.00	0.01	0.50	0.00	0.29	0.06	0.13	0.00	0.00	0.00	0.00	0.07
04	0.00	0.00	0.34	0.35	0.41	0.13	0.17	0.00	0.00	0.00	0.00	0.00
05	0.00	0.16	0.21	0.19	0.18	0.20	0.01	0.00	0.00	0.00	0.00	0.11
06	0.00	0.00	0.49	0.01	0.09	0.54	0.00	0.00	0.00	0.00	0.00	0.64
07	0.54	0.28	0.85	0.01	0.00	0.23	0.00	0.00	0.00	0.25	0.40	0.01
08	0.00	0.16	2.12	0.00	0.00	0.10	0.00	0.00	0.00	0.20	0.00	0.00
09	0.01	0.00	0.36	0.01	0.00	1.24	0.00	0.00	0.07	0.13	0.00	0.00
10	0.46	0.01	1.04	0.00	0.02	0.33	0.00	0.00	0.39	0.00	0.00	0.00
11	0.00	0.33	0.23	0.09	0.42	0.18	0.00	0.00	0.03	0.00	0.00	0.00
12	0.02	0.26	0.69	0.68	0.55	0.30	0.25	0.00	0.00	0.00	0.00	0.00
13	0.00	2.04	0.31	0.29	0.65	0.47	0.31	0.00	0.06	0.00	0.00	0.00
14	0.00	2.32	0.00	0.01	0.70	0.86	0.08	0.01	0.38	0.00	0.00	0.00
15	0.00	0.60	0.04	0.16	0.16	0.22	0.00	0.03	0.02	0.00	0.00	0.00
16	0.00	0.69	0.04	0.52	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.05	1.61	1.34	0.42	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.76
18	0.07	0.21	1.11	0.10	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.01
19	0.06	0.09	0.06	0.45	0.47	0.00	0.00	0.50	0.00	0.00	0.00	0.16
20	0.00	0.00	0.67	0.66	0.02	0.24	0.00	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.92	1.18	0.12	0.25	0.00	0.06	0.00	0.00	0.00	0.00
22	0.00	0.00	0.35	0.20	0.11	0.09	0.37	0.01	0.02	0.09	0.00	0.00
23	0.00	0.16	1.14	0.55	0.01	0.25	0.07	0.00	0.48	0.00	0.00	0.23
24	0.01	0.12	0.17	0.00	0.00	0.17	0.14	0.00	0.07	0.00	0.00	0.01
25	0.30	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
26	0.32	0.00	0.00	0.00	0.28	0.05	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.34	0.31	0.11	0.02	0.00	0.00	0.00	0.00	0.00	0.01
28	0.42	0.00	0.02	1.08	0.40	0.00	0.00	0.02	0.00	0.00	0.00	0.00
29	0.26	0.00	0.00	0.55	0.29	0.00	0.00	0.02	0.00	0.00	0.00	0.00
30	1.40	0.02	0.00	0.13		0.00	0.00	0.00	0.00	0.00	0.00	0.02
31	2.37		0.00	0.06		0.00		0.00		0.00	0.12	
Total	6.29	9.92	14.16	8.01	6.04	7.53	1.53	0.65	1.56	0.67	0.60	2.36

Total Rainfall for Water Year 2016: 59.32

Notes:

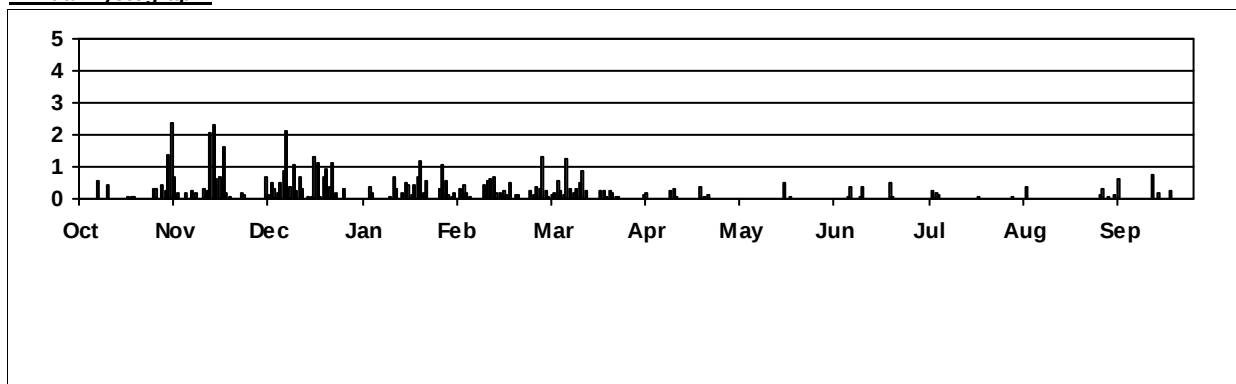
Precipitation is measured with a tipping bucket rain gauge. Ice and snow accumulations in the rain gauge are not measured until they melt.

Precipitation from snow is not measured accurately

Thurstun County Water Resources Unit

Visit our website at

Annual Hyetograph:



69u--Summit Lake_Rain

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.00	0.00	0.00	0.23	0.09	0.11	0.00	0.21	0.00	0.00	0.56
02	0.00	0.48	0.00	0.06	0.39	0.03	0.00	0.00	0.08	0.00	0.00	0.05
03	0.00	0.77	0.01	0.00	0.05	0.00	0.10	0.00	0.00	0.00	0.00	0.09
04	0.02	0.16	0.14	3.33	0.40	0.01	0.01	0.04	0.00	0.00	0.00	0.00
05	0.00	0.39	0.19	2.41	1.26	0.00	0.00	0.33	0.00	0.00	0.00	0.04
06	0.00	1.27	0.24	0.00	1.41	0.00	0.02	0.00	0.00	0.00	0.00	0.39
07	0.00	0.00	0.01	0.01	1.44	0.00	0.08	0.00	0.00	0.00	0.00	0.00
08	0.00	0.01	0.31	0.00	0.68	0.00	0.07	0.00	0.00	0.00	0.07	0.00
09	0.00	0.23	0.69	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.01	0.00
10	0.07	0.00	2.19	0.26	0.12	0.01	0.98	0.00	0.00	0.00	0.00	0.00
11	0.06	0.00	0.59	0.11	0.05	0.30	0.17	0.03	0.00	0.01	0.00	0.00
12	0.02	0.00	0.04	0.01	0.07	0.00	0.09	0.09	0.00	0.00	0.00	0.00
13	0.84	0.00	0.01	0.00	0.00	0.29	0.41	0.11	0.00	0.00	0.00	0.00
14	0.11	0.00	0.00	0.00	0.00	1.60	0.20	0.01	0.00	0.00	0.54	0.00
15	0.47	0.00	0.01	0.54	0.00	2.10	0.00	0.00	0.00	0.00	0.00	0.14
16	0.03	0.00	0.08	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.07
17	0.47	0.01	0.12	1.59	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.25
18	0.14	0.00	0.80	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.06	0.02	0.24	0.14	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.02
20	0.22	0.05	3.31	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.27
21	0.32	0.89	1.09	0.02	0.01	0.42	0.00	0.00	0.00	0.00	0.00	0.00
22	2.34	0.63	0.00	0.09	0.00	0.10	0.00	0.02	0.00	0.00	0.00	0.00
23	0.82	0.76	0.44	0.86	0.01	0.62	0.29	0.00	0.00	0.00	0.00	0.00
24	0.42	0.59	0.21	0.18	0.00	0.26	0.43	0.00	0.00	0.03	0.00	0.00
25	1.31	1.33	0.01	0.00	0.06	0.90	0.11	0.00	0.00	0.03	0.00	0.38
26	0.52	0.30	0.04	0.00	0.34	0.00	0.03	0.00	0.00	0.03	0.00	0.00
27	0.20	0.95	0.59	0.00	0.54	0.29	0.03	0.00	0.00	0.00	0.00	0.00
28	0.51	0.47	0.01	0.00	0.00	0.08	0.03	0.00	0.00	0.00	0.26	0.00
29	0.21	0.04	0.26	0.00		0.00	0.08	0.00	0.00	0.00	1.37	0.00
30	0.69	0.00	0.00	0.00		0.05	0.00	0.00	0.00	0.00	0.66	0.00
31	0.43		0.00	0.00		0.26		0.00		0.00	0.21	
Total	10.28	9.35	11.63	10.17	7.57	7.67	3.24	0.63	0.29	0.10	3.12	2.26

Total Rainfall for Water Year 2015: 66.31

Notes:

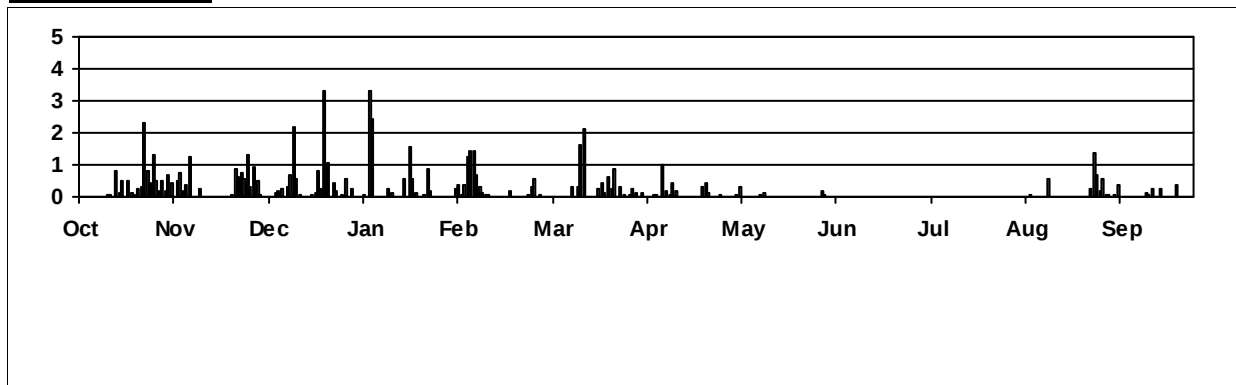
Precipitation is measured with a tipping bucket rain gauge. Ice and snow accumulations in the rain gauge are not measured until they melt.

Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

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Annual Hyetograph:



69u--Summit Lake_Rain

Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.93	1.07	0.01	0.08	2.15	0.00	0.00	0.02	0.00	0.00	0.42
02	0.01	0.35	0.22	0.00	0.05	0.57	0.00	0.00	0.14	0.00	0.03	0.11
03	0.00	0.00	1.10	0.01	0.77	0.21	0.26	0.00	0.00	0.00	0.00	0.00
04	0.00	0.02	0.48	0.23	0.51	0.36	0.31	0.00	0.00	0.00	0.00	0.01
05	0.00	0.12	1.76	0.21	0.56	0.62	0.02	0.00	0.00	0.00	0.00	0.07
06	0.00	0.02	0.74	0.13	0.45	1.30	0.00	0.00	0.00	0.00	0.00	0.46
07	0.65	0.66	1.41	0.02	0.00	0.57	0.00	0.00	0.00	0.24	0.31	0.02
08	0.00	0.57	3.50	0.00	0.00	0.11	0.00	0.00	0.00	0.16	0.00	0.00
09	0.14	0.00	0.81	0.00	0.00	2.88	0.00	0.00	0.38	0.11	0.00	0.00
10	1.33	0.09	1.50	0.01	0.11	0.99	0.00	0.00	0.32	0.00	0.00	0.00
11	0.00	0.44	0.68	0.31	0.55	0.24	0.00	0.00	0.06	0.00	0.00	0.00
12	0.23	1.26	1.34	1.43	0.58	0.56	0.49	0.00	0.00	0.01	0.00	0.00
13	0.00	3.14	0.71	0.12	1.05	1.70	0.54	0.00	0.10	0.00	0.00	0.00
14	0.00	3.53	0.00	0.00	0.71	1.08	0.16	0.00	0.21	0.00	0.00	0.00
15	0.00	0.60	0.12	0.31	0.41	0.13	0.00	0.00	0.23	0.00	0.00	0.00
16	0.00	0.96	0.01	1.22	0.19	0.01	0.00	0.00	0.00	0.00	0.00	0.00
17	0.04	4.07	2.05	0.83	0.33	0.00	0.00	0.00	0.01	0.00	0.00	0.59
18	0.08	0.11	1.52	0.18	0.33	0.00	0.00	0.00	0.23	0.00	0.00	0.01
19	0.07	0.09	0.09	0.41	1.27	0.01	0.00	0.03	0.00	0.00	0.00	0.32
20	0.00	0.00	1.01	0.92	0.25	0.22	0.00	0.07	0.00	0.00	0.00	0.00
21	0.00	0.01	1.71	2.33	0.39	0.93	0.00	0.11	0.00	0.00	0.00	0.00
22	0.00	0.01	0.86	0.30	0.11	0.10	0.26	0.08	0.05	0.00	0.00	0.00
23	0.00	0.16	1.42	0.46	0.00	0.40	0.31	0.00	0.20	0.00	0.00	0.38
24	0.02	0.23	0.37	0.00	0.00	0.49	0.24	0.00	0.10	0.00	0.00	0.00
25	0.54	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
26	0.91	0.01	0.01	0.17	0.19	0.13	0.00	0.00	0.00	0.00	0.00	0.00
27	0.01	0.00	1.20	0.65	0.10	0.15	0.01	0.00	0.00	0.00	0.00	0.02
28	0.31	0.00	0.04	1.49	0.86	0.00	0.01	0.20	0.00	0.00	0.00	0.00
29	0.41	0.00	0.00	0.83	0.42	0.00	0.00	0.11	0.00	0.00	0.00	0.00
30	2.07	0.10	0.01	0.16		0.00	0.01	0.00	0.00	0.00	0.00	0.04
31	3.11		0.00	0.11		0.00		0.00		0.00	0.15	
Total	9.93	17.48	25.74	12.85	10.27	15.92	2.62	0.60	2.05	0.52	0.49	2.45

Total Rainfall for Water Year 2016: 100.92

Notes:

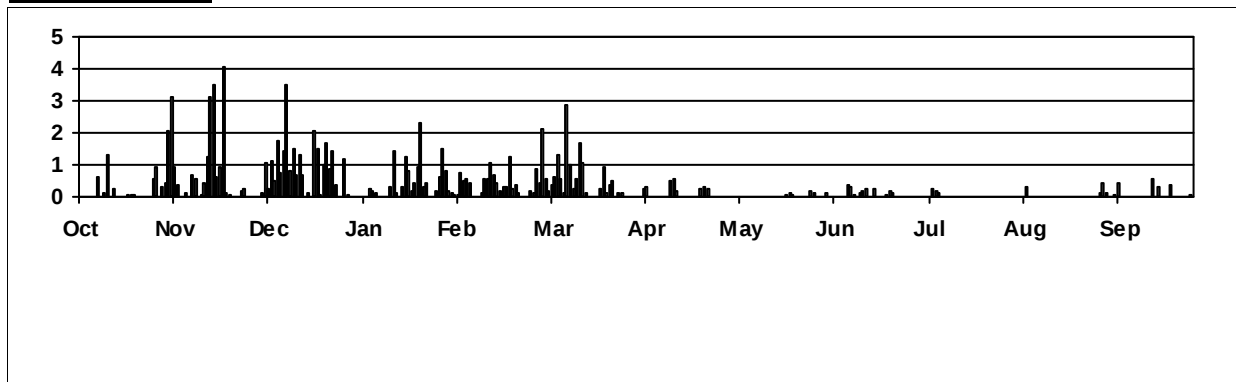
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Annual Hyetograph:



18u--Lacey Fire Dist. 3 Fire Station_Rain

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.00	0.00	0.00	0.11	0.00	0.06	0.00	0.10	0.00	0.00	0.29
02	0.00	0.11	0.01	0.03	0.30	0.00	0.00	0.00	0.03	0.00	0.00	0.02
03	0.00	0.34	0.00	0.01	0.01	0.00	0.15	0.00	0.00	0.00	0.00	0.23
04	0.00	0.27	0.02	2.28	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
05	0.00	0.20	0.11	1.10	0.87	0.00	0.00	0.17	0.00	0.00	0.00	0.00
06	0.00	0.71	0.14	0.00	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.12
07	0.00	0.01	0.00	0.01	1.53	0.00	0.09	0.00	0.00	0.00	0.00	0.01
08	0.00	0.00	0.28	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09	0.00	0.28	0.53	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.05	0.01	0.87	0.04	0.01	0.01	0.60	0.00	0.00	0.00	0.01	0.00
11	0.43	0.00	0.36	0.05	0.01	0.14	0.03	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.29	0.01	0.01	0.00	0.01	0.27	0.00	0.00	0.00	0.00
13	0.63	0.00	0.00	0.00	0.01	0.19	0.10	0.11	0.00	0.00	0.00	0.00
14	0.21	0.00	0.00	0.00	0.00	1.15	0.06	0.00	0.00	0.00	1.17	0.00
15	0.22	0.00	0.01	0.45	0.00	2.19	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.03	0.03	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.12
17	0.20	0.00	0.10	1.32	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.16
18	0.08	0.00	0.41	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.01	0.05	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01
20	0.36	0.01	1.52	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00
21	0.04	0.79	0.34	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.00
22	1.49	0.39	0.00	0.08	0.00	0.03	0.00	0.02	0.00	0.00	0.00	0.00
23	0.59	0.72	0.41	0.28	0.00	0.44	0.08	0.01	0.00	0.00	0.00	0.00
24	0.35	0.39	0.17	0.08	0.00	0.15	0.36	0.00	0.00	0.00	0.00	0.00
25	0.45	1.14	0.01	0.00	0.08	0.32	0.02	0.00	0.00	0.00	0.00	0.20
26	0.24	0.04	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.07	0.00	0.00
27	0.05	0.73	0.27	0.00	0.56	0.14	0.01	0.00	0.00	0.00	0.00	0.00
28	0.71	0.72	0.13	0.00	0.00	0.04	0.01	0.00	0.01	0.00	0.12	0.00
29	0.06	0.02	0.08	0.00		0.00	0.08	0.00	0.00	0.00	1.15	0.00
30	0.53	0.00	0.00	0.01		0.03	0.00	0.00	0.00	0.00	0.50	0.00
31	0.58		0.00	0.00		0.15		0.00		0.00	0.02	
Total	7.27	6.89	6.14	6.02	5.69	5.49	1.66	0.58	0.14	0.07	2.97	1.16

Total Rainfall for Water Year 2015: 44.08

Notes:

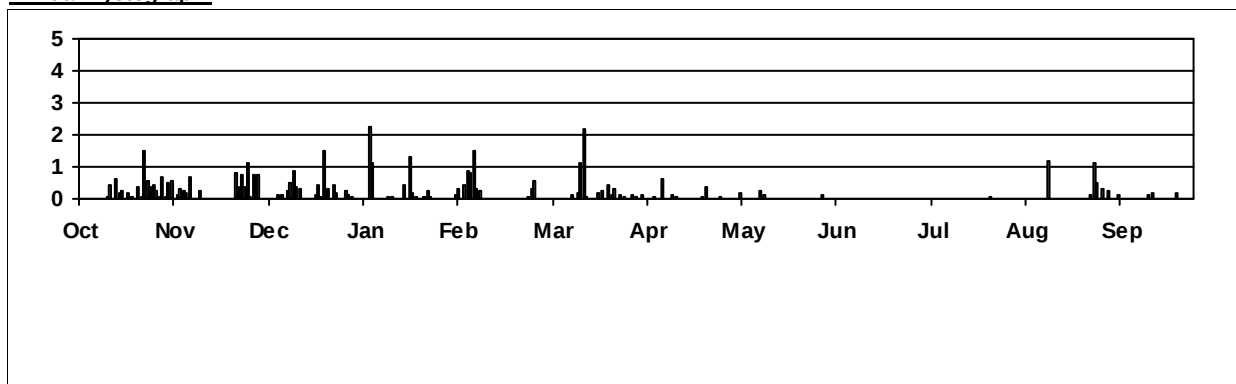
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Thurston County Water Resources Unit

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Annual Hyetograph:



18u--Lacey Fire Dist. 3 Fire Station_Rain

Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	1.26	0.70	0.01	0.06	1.67	0.00	0.00	0.09	0.00	0.00	0.25
02	0.00	0.10	0.06	0.00	0.02	0.29	0.00	0.00	0.01	0.00	0.00	0.02
03	0.00	0.00	0.48	0.00	0.41	0.25	0.23	0.00	0.00	0.00	0.00	0.00
04	0.00	0.01	0.41	0.32	0.37	0.19	0.19	0.01	0.00	0.00	0.00	0.00
05	0.00	0.06	0.29	0.13	0.32	0.16	0.01	0.00	0.00	0.00	0.00	0.08
06	0.00	0.00	0.29	0.02	0.20	0.42	0.00	0.00	0.00	0.00	0.00	0.45
07	0.42	0.24	1.03	0.00	0.00	0.32	0.00	0.00	0.00	0.12	0.16	0.00
08	0.00	0.23	2.61	0.00	0.00	0.10	0.00	0.00	0.00	0.12	0.03	0.00
09	0.05	0.04	0.85	0.00	0.00	1.15	0.00	0.00	0.25	0.10	0.00	0.00
10	1.01	0.02	0.70	0.00	0.03	0.54	0.00	0.00	0.26	0.00	0.00	0.00
11	0.00	0.37	0.10	0.15	0.49	0.28	0.00	0.00	0.01	0.00	0.00	0.00
12	0.09	0.73	0.81	0.59	0.62	0.31	0.53	0.00	0.00	0.00	0.00	0.00
13	0.03	2.54	0.33	0.13	0.77	0.36	0.25	0.00	0.03	0.00	0.00	0.00
14	0.00	3.11	0.00	0.01	0.37	0.87	0.15	0.00	0.34	0.00	0.00	0.00
15	0.00	0.73	0.01	0.20	0.20	0.07	0.00	0.01	0.01	0.00	0.00	0.00
16	0.00	0.49	0.03	0.69	0.17	0.01	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	2.04	1.18	0.38	0.29	0.00	0.00	0.00	0.06	0.00	0.00	0.44
18	0.05	0.12	0.83	0.08	0.13	0.00	0.00	0.00	0.01	0.00	0.00	0.00
19	0.08	0.11	0.03	0.44	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.22
20	0.04	0.00	0.48	0.48	0.16	0.35	0.01	0.00	0.06	0.00	0.00	0.00
21	0.00	0.00	1.11	1.65	0.17	0.29	0.00	0.16	0.00	0.00	0.00	0.00
22	0.00	0.01	0.45	0.36	0.20	0.09	0.28	0.02	0.04	0.04	0.00	0.00
23	0.00	0.09	0.89	0.66	0.00	0.22	0.02	0.00	0.21	0.00	0.00	0.14
24	0.02	0.23	0.21	0.00	0.00	0.18	0.05	0.00	0.02	0.00	0.00	0.00
25	0.23	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.25	0.00	0.00	0.01	0.22	0.17	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.42	0.73	0.17	0.02	0.00	0.00	0.00	0.00	0.00	0.01
28	0.31	0.01	0.09	0.94	0.43	0.00	0.00	0.05	0.00	0.00	0.00	0.00
29	0.25	0.01	0.00	0.52	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	1.55	0.01	0.00	0.08		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	2.16		0.00	0.04		0.00		0.00		0.00	0.11	
Total	6.54	12.56	14.41	8.62	6.58	8.31	1.72	0.25	1.40	0.38	0.30	1.61

Total Rainfall for Water Year 2016: 62.68

Notes:

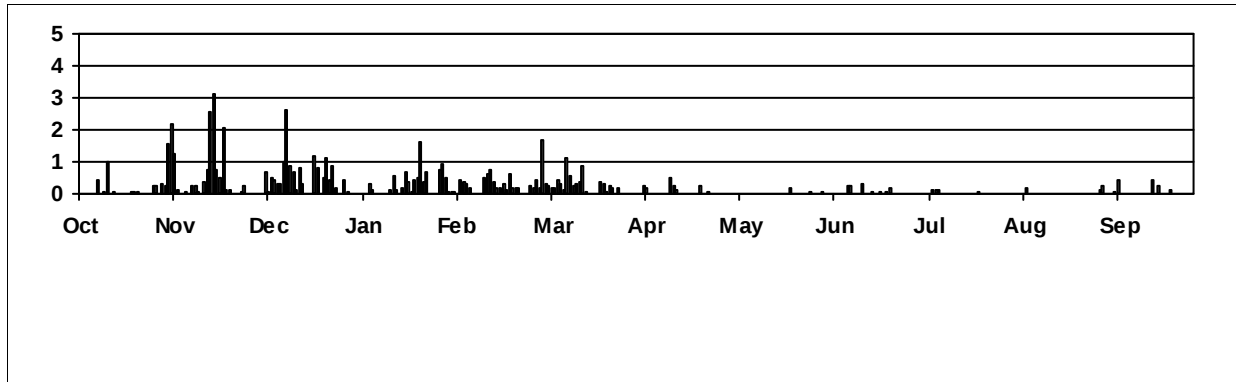
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Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

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Annual Hyetograph:



20u--Southbay Firestation_Rain

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.00	0.00	0.00	0.09	0.00	0.02	0.00	0.10	0.00	0.00	0.39
02	0.00	0.16	0.01	0.02	0.41	0.00	0.01	0.00	0.03	0.00	0.00	0.06
03	0.00	0.30	0.00	0.00	0.02	0.00	0.08	0.00	0.00	0.00	0.00	0.15
04	0.00	0.27	0.02	1.83	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00
05	0.00	0.18	0.17	0.93	0.92	0.00	0.00	0.08	0.00	0.00	0.00	0.00
06	0.00	0.44	0.14	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.13
07	0.00	0.00	0.01	0.01	1.36	0.00	0.07	0.00	0.00	0.00	0.00	0.00
08	0.00	0.00	0.33	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09	0.00	0.27	0.62	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.06	0.00	1.00	0.09	0.02	0.01	0.53	0.00	0.00	0.00	0.01	0.00
11	0.05	0.00	0.44	0.12	0.00	0.15	0.06	0.00	0.00	0.02	0.00	0.00
12	0.01	0.00	0.18	0.01	0.04	0.01	0.00	0.22	0.00	0.00	0.00	0.00
13	0.54	0.00	0.01	0.00	0.00	0.17	0.08	0.15	0.00	0.00	0.00	0.00
14	0.19	0.00	0.00	0.00	0.00	1.03	0.00	0.00	0.00	0.00	0.85	0.00
15	0.15	0.00	0.00	0.46	0.00	2.35	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.04	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.09
17	0.20	0.00	0.08	1.46	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.12
18	0.10	0.00	0.45	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.06	0.04	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.25	0.00	1.45	0.00	0.01	0.23	0.00	0.00	0.00	0.00	0.00	0.01
21	0.16	0.79	0.13	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00
22	1.40	0.41	0.00	0.06	0.00	0.04	0.00	0.04	0.00	0.00	0.00	0.00
23	0.98	0.66	0.42	0.26	0.00	0.58	0.07	0.01	0.00	0.00	0.00	0.00
24	0.37	0.36	0.14	0.09	0.00	0.21	0.43	0.00	0.00	0.00	0.00	0.00
25	0.45	1.23	0.00	0.00	0.04	0.25	0.03	0.00	0.00	0.00	0.00	0.14
26	0.29	0.04	0.01	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.01
27	0.06	0.63	0.24	0.00	0.58	0.10	0.00	0.00	0.00	0.00	0.00	0.00
28	0.65	0.72	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00
29	0.13	0.01	0.16	0.00		0.00	0.11	0.00	0.00	0.00	1.32	0.00
30	0.47	0.00	0.00	0.00		0.03	0.00	0.00	0.00	0.00	0.40	0.00
31	0.61		0.00	0.00		0.06		0.00		0.00	0.01	
Total	7.12	6.47	6.19	5.49	5.43	5.52	1.49	0.50	0.13	0.02	2.70	1.10

Total Rainfall for Water Year 2015: 42.16

Notes:

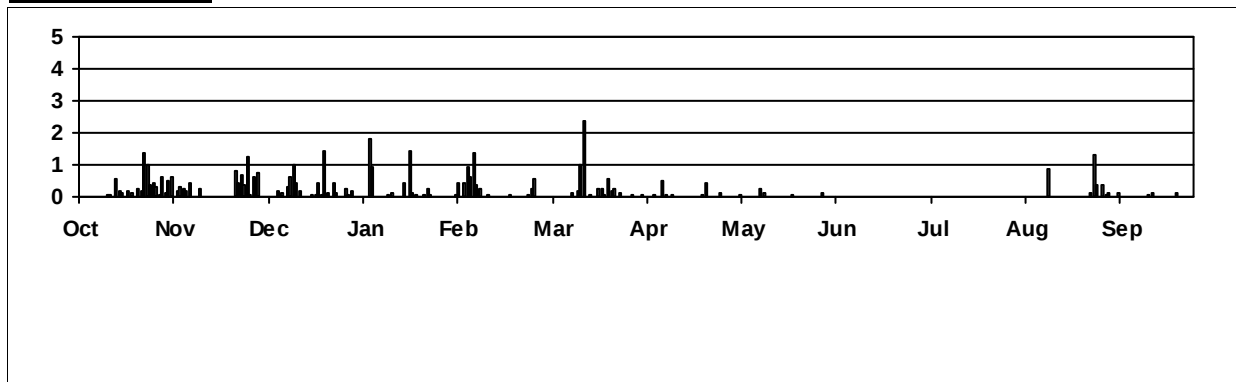
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Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

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Annual Hyetograph:



20u--Southbay Firestation_Rain

Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.67	0.72	0.00	0.02	1.46	0.00	0.00	0.10	0.00	0.00	0.29
02	0.00	0.02	0.09	0.00	0.02	0.25	0.00	0.00	0.02	0.00	0.00	0.02
03	0.00	0.00	0.54	0.00	0.38	0.16	0.19	0.00	0.00	0.00	0.00	0.00
04	0.00	0.00	0.40	0.36	0.34	0.23	0.23	0.01	0.00	0.00	0.00	0.00
05	0.00	0.07	0.47	0.14	0.49	0.23	0.01	0.00	0.00	0.00	0.00	0.05
06	0.00	0.00	0.32	0.02	0.19	0.55	0.00	0.00	0.00	0.00	0.00	0.40
07	0.47	0.25	1.07	0.01	0.00	0.32	0.00	0.00	0.00	0.11	0.05	0.00
08	0.00	0.49	1.99	0.00	0.00	0.15	0.00	0.00	0.00	0.11	0.00	0.00
09	0.04	0.01	0.53	0.01	0.00	1.28	0.00	0.00	0.40	0.10	0.00	0.00
10	0.91	0.02	0.75	0.00	0.02	0.45	0.00	0.00	0.23	0.00	0.00	0.00
11	0.00	0.28	0.13	0.20	0.45	0.30	0.00	0.00	0.01	0.00	0.00	0.00
12	0.06	0.54	0.81	0.71	0.65	0.29	0.62	0.00	0.00	0.00	0.00	0.00
13	0.03	2.15	0.24	0.08	0.73	0.44	0.21	0.00	0.00	0.00	0.00	0.00
14	0.00	3.07	0.00	0.00	0.31	0.60	0.15	0.00	0.16	0.00	0.00	0.00
15	0.00	0.81	0.01	0.16	0.21	0.03	0.01	0.00	0.00	0.00	0.00	0.00
16	0.00	0.55	0.01	0.76	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	1.50	1.34	0.37	0.31	0.00	0.00	0.00	0.07	0.00	0.00	0.34
18	0.08	0.12	0.84	0.09	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.01
19	0.01	0.11	0.02	0.42	0.61	0.00	0.00	0.04	0.00	0.00	0.00	0.13
20	0.00	0.00	0.30	0.50	0.20	0.35	0.01	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	1.15	1.93	0.16	0.36	0.00	0.21	0.00	0.00	0.00	0.00
22	0.00	0.00	0.48	0.20	0.07	0.07	0.27	0.01	0.05	0.01	0.00	0.00
23	0.00	0.10	0.57	0.61	0.00	0.22	0.02	0.00	0.39	0.00	0.00	0.15
24	0.01	0.21	0.17	0.00	0.00	0.37	0.05	0.00	0.06	0.00	0.00	0.00
25	0.39	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.24	0.00	0.00	0.02	0.16	0.25	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.45	0.82	0.16	0.04	0.00	0.00	0.00	0.00	0.00	0.01
28	0.31	0.01	0.04	0.89	0.45	0.00	0.00	0.09	0.00	0.00	0.00	0.00
29	0.37	0.01	0.00	0.54	0.17	0.00	0.00	0.02	0.00	0.00	0.00	0.00
30	1.27	0.01	0.01	0.09		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	1.47		0.00	0.02		0.00		0.00		0.00	0.08	
Total	5.66	11.00	13.48	8.95	6.35	8.40	1.77	0.38	1.49	0.33	0.13	1.40

Total Rainfall for Water Year 2016: 59.34

Notes:

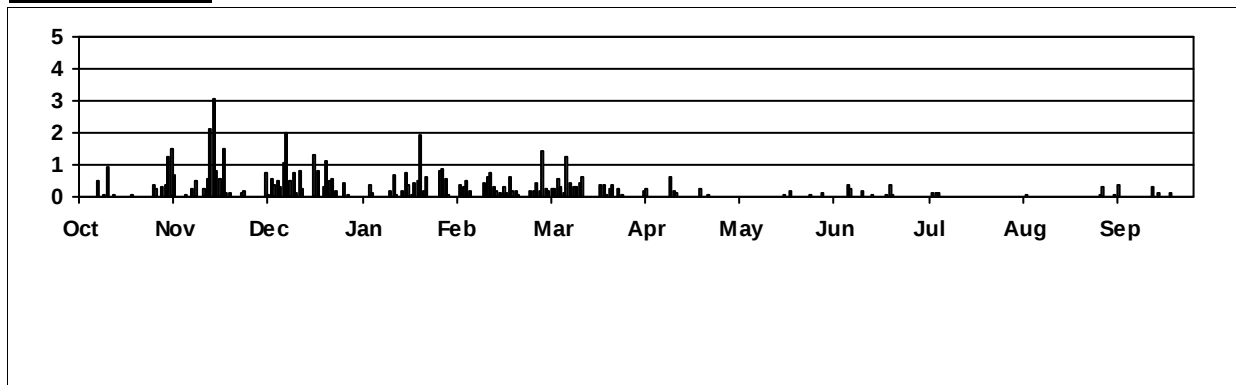
Precipitation is measured with a tipping bucket rain gauge. Ice and snow accumulations in the rain gauge are not measured until they melt.

Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

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23u--Percival Creek, Bldg 4_Rain

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.00	0.00	0.00	0.13	0.00	0.03	0.00	0.11	0.00	0.00	0.27
02	0.00	0.17	0.01	0.02	0.33	0.00	0.00	0.00	0.01	0.00	0.00	0.01
03	0.00	0.35	0.00	0.00	0.02	0.00	0.16	0.00	0.00	0.00	0.00	0.19
04	0.00	0.44	0.02	2.51	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.01
05	0.00	0.21	0.16	1.16	0.94	0.00	0.00	0.18	0.00	0.00	0.00	0.00
06	0.00	0.63	0.19	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.18
07	0.00	0.01	0.01	0.01	1.52	0.00	0.08	0.00	0.00	0.00	0.00	0.00
08	0.00	0.00	0.21	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09	0.00	0.15	0.73	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.05	0.01	0.99	0.08	0.01	0.00	0.59	0.00	0.00	0.00	0.00	0.00
11	0.27	0.00	0.42	0.07	0.00	0.21	0.04	0.01	0.00	0.07	0.00	0.00
12	0.00	0.00	0.29	0.00	0.04	0.02	0.02	0.22	0.00	0.00	0.00	0.00
13	0.56	0.00	0.00	0.00	0.00	0.17	0.12	0.12	0.00	0.01	0.00	0.00
14	0.21	0.00	0.00	0.00	0.00	1.28	0.06	0.00	0.00	0.00	1.23	0.00
15	0.14	0.00	0.00	0.49	0.00	2.09	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.02	0.03	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.11
17	0.24	0.00	0.08	1.46	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.15
18	0.14	0.00	0.43	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.06	0.10	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.30	0.04	1.95	0.00	0.01	0.23	0.00	0.00	0.00	0.00	0.00	0.01
21	0.12	0.94	0.39	0.01	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00
22	1.73	0.29	0.00	0.06	0.00	0.02	0.00	0.03	0.00	0.00	0.00	0.00
23	0.83	0.72	0.43	0.40	0.00	0.46	0.11	0.00	0.00	0.00	0.00	0.00
24	0.34	0.40	0.15	0.07	0.00	0.13	0.36	0.00	0.00	0.00	0.00	0.00
25	0.49	0.90	0.00	0.00	0.03	0.48	0.03	0.00	0.00	0.00	0.00	0.17
26	0.22	0.10	0.01	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.01
27	0.07	0.94	0.28	0.00	0.61	0.08	0.01	0.00	0.00	0.00	0.00	0.00
28	0.83	0.33	0.03	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.14	0.00
29	0.14	0.01	0.13	0.00		0.00	0.03	0.00	0.00	0.00	1.31	0.00
30	0.47	0.00	0.00	0.00		0.03	0.00	0.00	0.00	0.00	0.39	0.00
31	0.53		0.00	0.00		0.16		0.00		0.00	0.03	
Total	7.68	6.64	6.99	6.66	5.68	5.70	1.64	0.56	0.13	0.08	3.10	1.11

Total Rainfall for Water Year 2015: 45.97

Notes:

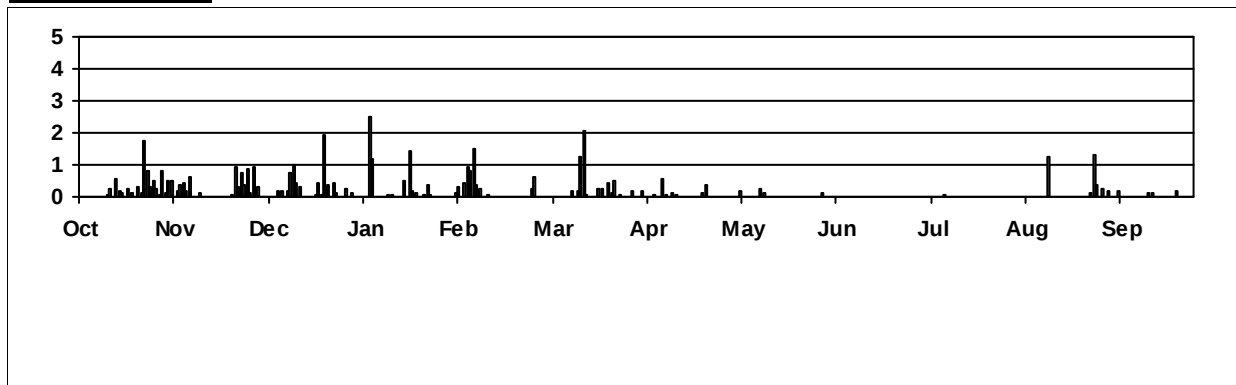
Precipitation is measured with a tipping bucket rain gauge. Ice and snow accumulations in the rain gauge are not measured until they melt.

Precipitation from snow is not measured accurately

Thurston County Water Resources Unit

Visit our website at

Annual Hyetograph:



23u--Percival Creek, Bldg 4_Rain

Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	1.00	0.90	0.00	0.08	1.69	0.00	0.00	0.08	0.00	0.00	0.26
02	0.02	0.25	0.10	0.00	0.04	0.30	0.00	0.00	0.00	0.00	0.00	0.02
03	0.01	0.01	0.56	0.00	0.43	0.21	0.23	0.00	0.00	0.00	0.00	0.00
04	0.00	0.01	0.37	0.39	0.41	0.25	0.12	0.00	0.00	0.00	0.00	0.02
05	0.00	0.08	0.31	0.14	0.41	0.26	0.02	0.00	0.00	0.00	0.00	0.07
06	0.00	0.00	0.45	0.01	0.17	0.65	0.00	0.00	0.00	0.00	0.00	0.43
07	0.44	0.40	1.11	0.00	0.00	0.39	0.00	0.00	0.00	0.15	0.10	0.00
08	0.00	0.28	2.55	0.00	0.00	0.11	0.00	0.00	0.00	0.16	0.01	0.00
09	0.03	0.00	0.70	0.00	0.00	1.58	0.00	0.02	0.15	0.09	0.00	0.00
10	0.87	0.05	0.89	0.00	0.03	0.50	0.00	0.00	0.50	0.00	0.00	0.00
11	0.00	0.29	0.14	0.20	0.51	0.31	0.00	0.00	0.00	0.01	0.00	0.00
12	0.02	1.30	0.94	0.77	0.81	0.31	0.58	0.00	0.00	0.00	0.00	0.00
13	0.00	2.99	0.39	0.11	0.93	0.57	0.34	0.00	0.06	0.00	0.00	0.00
14	0.00	2.95	0.00	0.00	0.43	0.82	0.14	0.00	0.24	0.00	0.00	0.00
15	0.00	0.71	0.04	0.24	0.28	0.09	0.00	0.00	0.02	0.00	0.00	0.00
16	0.00	0.96	0.01	0.87	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.02	2.41	1.43	0.41	0.35	0.00	0.00	0.00	0.06	0.00	0.00	0.44
18	0.02	0.15	0.84	0.08	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.01
19	0.13	0.10	0.03	0.45	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.23
20	0.05	0.00	0.49	0.63	0.27	0.30	0.00	0.01	0.00	0.00	0.00	0.00
21	0.00	0.01	1.11	2.07	0.17	0.52	0.00	0.09	0.00	0.00	0.00	0.00
22	0.00	0.00	0.48	0.21	0.13	0.14	0.20	0.04	0.05	0.05	0.00	0.00
23	0.00	0.07	1.05	0.59	0.00	0.25	0.01	0.00	0.13	0.00	0.00	0.37
24	0.00	0.22	0.26	0.00	0.00	0.21	0.06	0.00	0.02	0.00	0.00	0.00
25	0.31	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.44	0.00	0.00	0.05	0.18	0.35	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.54	0.88	0.14	0.07	0.00	0.00	0.00	0.00	0.00	0.00
28	0.32	0.00	0.10	1.04	0.53	0.00	0.00	0.04	0.00	0.00	0.00	0.00
29	0.24	0.00	0.00	0.53	0.20	0.00	0.02	0.00	0.00	0.00	0.00	0.00
30	1.62	0.02	0.00	0.08		0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	2.50		0.01	0.03		0.00		0.00		0.00	0.11	
Total	7.04	14.26	15.81	9.78	7.48	9.88	1.72	0.20	1.31	0.46	0.22	1.85

Total Rainfall for Water Year 2016: 70.01

Notes:

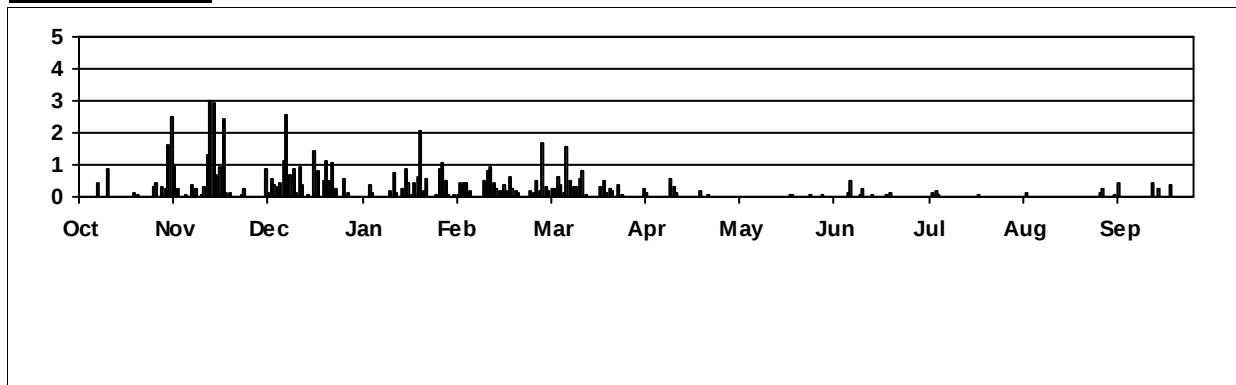
Precipitation is measured with a tipping bucket rain gauge. Ice and snow accumulations in the rain gauge are not measured until they melt.

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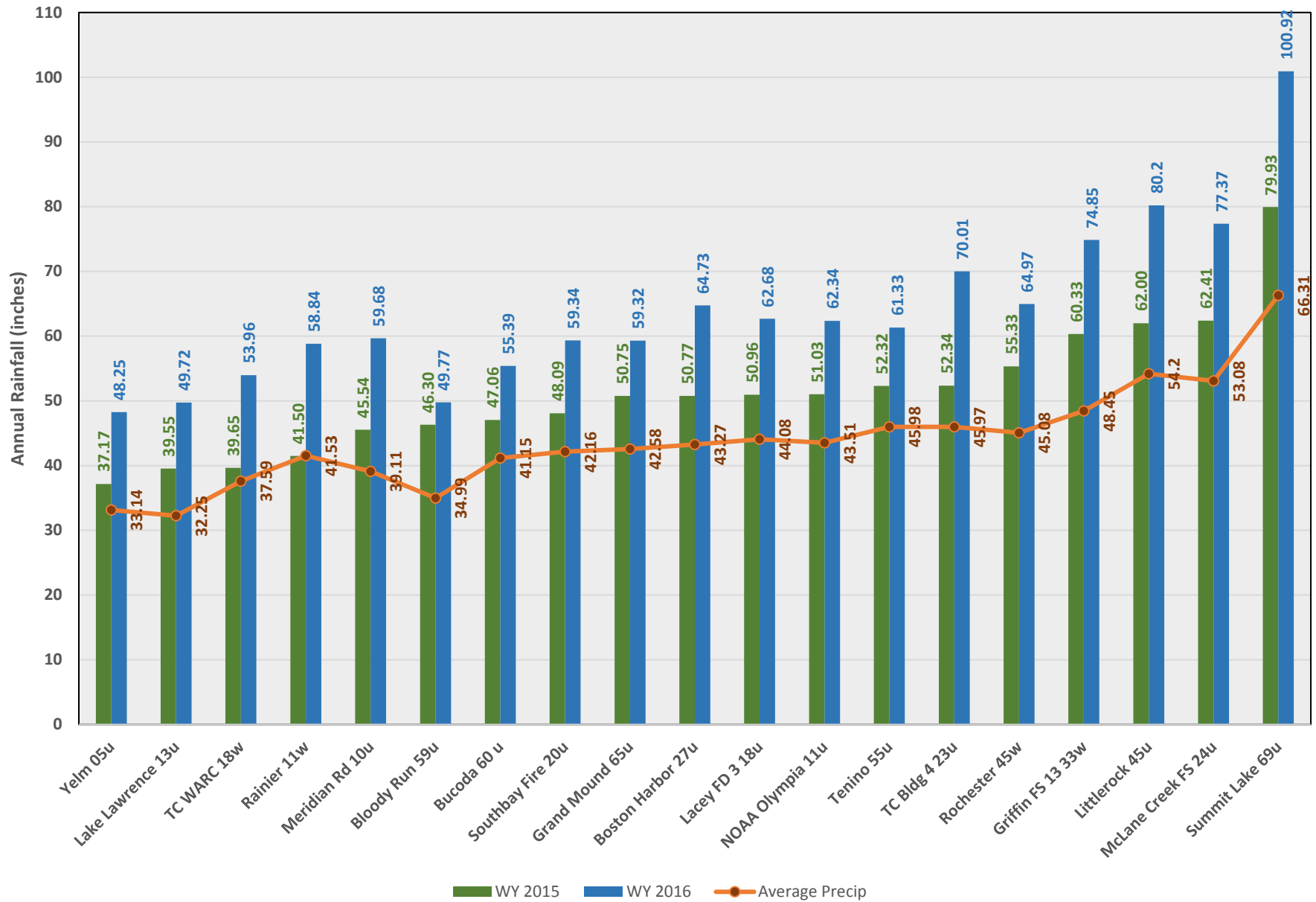
Precipitation Data Comparison for all Precipitation Sites
Water Year 2015 and 2016 compared to station Averages

Gage Name	Average	WY 2015	WY 2016
Yelm 05u	37.17	33.14	48.25
Lake Lawrence 13u	39.55	32.25	49.72
TC WARC 18w	39.65	37.59	53.96
Rainier 11w	41.50	41.53	58.84
Meridian Rd 10u	45.54	39.11	59.68
Bloody Run 59u	46.30	34.99	49.77
Bucoda 60 u	47.06	41.15	55.39
Southbay Fire 20u	48.09	42.16	59.34
Grand Mound 65u	50.75	42.58	59.32
Boston Harbor 27u	50.77	43.27	64.73
Lacey FD 3 18u	50.96	44.08	62.68
NOAA Olympia 11u	51.03	43.51	62.34
Tenino 55u	52.32	45.98	61.33
TC Bldg 4 23u	52.34	45.97	70.01
Rochester 45w	55.33	45.08	64.97
Griffin FS 13 33w	60.33	48.45	74.85
Littlerock 45u	62.00	54.2	80.2
McLane Creek FS 24u	62.41	53.08	77.37
Summit Lake 69u	79.93	66.31	100.92

Sites are sorted lowest to highest based on their average precipitation

Summary Report and Analysis of Water Years 2015 – 2016

Water Year 2015 and 2016 Rainfall Compared to Average Rainfall - All Sites



2015 Summary of Drought Conditions for Thurston County, Washington

1 DISCUSSION AND OVERVIEW

It may surprise people to look at the current precipitation amounts and conclude that we are indeed in a drought. If you look solely at those precipitation numbers for 2015 you would not suspect that Thurston County was suffering from an acute drought. That is because a drought is not caused by lack of precipitation alone. It involves a much more complex set of climate conditions that, together, create the parched conditions from the mountains to the sea and from the land surface to the underground aquifers. These conditions also must persist over several months or seasons. The sections below provide some facts that explain why we are currently in a declared drought in Thurston County and Washington State.

In general, droughts are very complex and caused by a number of factors such as the following:

- Lack of rainfall *or* lack of the *normal pattern* of rainfall as is the case for Thurston County
- Only 3.8 inches of rain since April 1, 2015
- Below average rainfall in winter “capture and store” months
- No large “Pineapple Express” storms since January 2009. Before 2009 there was at least one every year, and usually two per winter.
- Low winter snow pack in higher elevations. Only 10 to 21 percent of normal snowpack fell in the winter of 2014 – 2015.
- Low atmospheric humidity (<20 percent) in spring and summer leading to excessive water loss by plants and leaf damage to sunburn
- Sustained high temperatures in summer *and* in winter see chart below
- Low soil moisture stressing roots and exacerbating low humidity

If we look at the past 5 years, we see that our rainfall pattern has been drying in the winter months beginning in 2011. As seen in the table below, monthly rainfall in the winter has changed dramatically over the past five years. If you only look at the annual rainfall numbers you can see that there is no consistency in the pattern of above or below average over the past five years. So this alone is not a good measure of drought. What is the key that is causing droughts in our region is the change in precipitation in winter months. They have been getting drier and warmer. The table below shows the lack of winter precipitation and this is very much a factor in Thurston County’s current drought. Prior to 2011 the wet winter months were actually wet and cold. They included large storms or periods of very wet weather that recharged the shallow and intermediate aquifers and heavy mountain snows replenished the snow pack. There was only one period of normal snowfall in the Cascades in November 2014. After that period there was only sporadic snowfall followed by very high freezing levels above 8000 feet with precipitation falling mainly in the form of rain.

Month	63 year Average	2015/ Δ	2014/ Δ	2013/ Δ	2012/ Δ	2011/ Δ
January	8.40	3.83/ -4.57	5.31/ -3.09	4.01/ -4.39	7.64/-0.76	6.83/-2.02
February	5.80	5.55/ -0.25	9.16/ +3.36	4.31/ -1.49	5.25/ -0.55	5.40/-0.40
March	4.85	5.95/ +1.10	10.46/ +5.61	4.38/ -0.47	8.76/ +3.91	8.82/+3.97
April	3.11	1.82/ -1.29	4.95/ +1.84	5.03/ +1.92	4.83/ +1.72	5.06/+1.95
May	1.83	0.63/ -1.20	3.71/ +1.88	3.03/ +1.20	2.56/ +0.72	4.06/+2.23
June	1.42	0.15/ -1.27	1.26/ -0.16	2.08/ + 0.66	1.89/ +0.47	0.17/-1.25
July	0.77	0.09/ -0.68	0.37/ -0.40	0.00/ -0.77	0.99/ +0.22	1.57/+0.80
August	1.31	1.10/ -0.21	2.20/ -0.89	1.28/ +0.03	0.05/ -1.26	0.21/-1.10
September	2.35	0.9/ NA	2.54/ -0.19	9.68/ +7.33	0.00/ -2.35	1.82/-0.53
October	4.60	---	7.26/ +2.66	1.76/ -2.48	7.88/+3.28	4.17/-0.43
November	8.83	---	6.43/ -2.40	4.10/ -4.73	9.56/+0.73	7.45/-1.38
December	8.55	---	6.64/ -1.91	1.26/ -7.29	10.84/+2.29	4.59/-3.96
Total	51.8		60.3/ +8.5	40.9/-10.9	60.2/+8.4	50.2/-1.6

Colored numbers are the change or departure from average. Blue = inches above average/ Red = inches below average

1.1 TEMPERATURE/HUMIDITY

2015 was the warmest year on record for much of the northern hemisphere including western Washington. The second warmest year was 2014. For Western Washington, the high temperature and the low humidity plays a very important role in this current drought because our region, with its forests and abundant vegetation, requires abundant soil and air moisture to maintain a healthy foliage. When high temperatures and low humidity reach a critical point the evapotranspiration rate becomes higher than the uptake of increasingly diminished soil moisture. If plants cannot maintain leaf moisture they become susceptible to solar radiation burn and cell death. Below are some numbers to contemplate.

- From April through early September 2015, there were 21 days with temperatures above 90 degrees. Five days were at or above 100 degrees locally. Typically we have 10 days at or above 90 degrees.
- 34 Days were above 80 degrees and the vast majority of the rest of this time was in the mid to upper 70s.
- Record temperature in January 26, 2015 of 66 degrees. Also 66 in February and 74 degrees March 26, 2015.
- Only 7 days since January 1, 2015 below 32 degrees. If you had a poor apple crop this year that is why. They require a lot more cold weather to produce good yields.
- Evapotranspiration (ET) measures the amount of water lost from the hydrologic cycle to evaporation from plants and atmospheric conditions. The typical ET loss up to this date is 18 inches. Evapotranspiration loss in 2015 is 24 inches up through September 1, 2015.
- Soil moisture is 75 percent below normal in the upper two feet of earth

- Record low relative humidity of 8 percent on numerous occasions in July and August
- 2015 was the worst wildfire season on record. 2014 was the second worst.

This is what is causing the wildfires to burn out of control and to spread so fast. There is very little available water in the vegetation to slow the spread of fire. The lack of humidity also allows the fires to ignite surrounding vegetation easier and burn hotter.

1.2 GROUNDWATER

Groundwater levels for the winter of 2014 and for 2015 are actually at or near normal levels in the basins that are routinely monitored by Thurston County. There was a slight increasing trend in the groundwater over the past five years. The consecutive dry and warm winters will likely cause groundwater levels to drop some but nowhere near record low levels seen in 2000 and 2001.

Groundwater is a result of several years of many different complex hydrologic cycles interacting with surface and subsurface waters. For this reason, the effects of any one of these systems may not cause an immediate decline in groundwater overall. The typical groundwater cycle for Thurston County's aquifers is:

- One (1) year lag for the upper shallow (less than fifty feet) aquifers such as Salmon Creek Basin;
- Three (3) to five (5) years for areas where the groundwater static depth is below fifty feet such as in the Scatter Creek Aquifer
- Tens to hundreds (possibly even thousands) of years for the deep, massive groundwater aquifers such as the McAllister deep wellfield and the artesian well sources.
- Prolonged droughts lasting multiple seasons or years will affect all aquifers at some point because the withdrawal/use rate will exceed the recharge rate.
- Effects of drought are usually not seen in groundwater in the same season it occurs. It will be identified in the future as the lag times listed above approach.

Areas where groundwater is immediately affected by surface waters is where it is in direct hydraulic connectivity with a surface water source such as a river, wetland or lake. These systems can be dramatically affected within one season in response to their source supply. Examples of these types of aquifers occur along almost every river system in the County. Even if the main aquifer is not regulated by a river or surface source some components of it can be because they are so intimately connected.

The most striking example of this type of relationship occurs in the Scatter Creek Aquifer. This aquifer is unique in many ways but it is also dependent on input from the Chehalis River. It is only in the last couple miles where it interacts hydraulically with the Chehalis River. The majority of the aquifer does not directly interact with the river but where it does near Grand Mound the water levels can fluctuate in lockstep with the Chehalis. This occurs in droughts and floods affecting groundwater as the river rises or falls.

During this recent drought only the shallow and intermediate aquifers are showing a response currently. The ones that are showing dramatically lower water levels are the aquifers in connection with major river systems as discussed in the next section.

1.3 STREAMFLOWS

Although hydraulically we are not having record low rainfall, some rivers and streams in our area are at record lows. This is affecting not only Thurston County but the entire western U.S. California is by far the most affected but in 2014 Washington and Oregon were added to the drought concern list. In 2015 Washington State was placed well within a severe drought declaration. Below are some astonishing numbers that illustrate the lack of surface water available for drinking water, power generation, irrigation and fish flows. Many of Western Washington's largest rivers recorded their lowest levels in history in 2015.

There is only one river in Thurston County with its source high in the Cascade Mountains. The Nisqually River with headwaters originating from Mt Rainier is directly affected by snowmelt from the higher elevation snowfields and glaciers. Two other rivers, the Deschutes River and the Chehalis River, also have their sources in the Cascades but at lower elevations that are modestly affected by snowmelt. Chehalis River with sources from Cascade foothills and the Willapa Hills. Another main tributary to the Chehalis is the Skookumchuck River which is regulated by the Skookumchuck Dam. All of these rivers are closely tied to shallow aquifers in their lower reaches that are very much influenced by the amount of water these rivers carry as discussed in the groundwater section 1.2.

All other streams in Thurston County come from low hills, wetlands, groundwater or short semi-urbanized sources. Below is a table showing current and average streamflows from some of our rivers and streams around Thurston County as of August 31, 2015.

River System	Source	Sept 2015 Flow *(cfs)	Average Flow for Sept (cfs)	Comment
¹ Nisqually River above Dam	Mt. Rainier	760	815	Slightly below normal
¹ Nisqually River Below Dam	Below Alder Lake	209	400	Below Normal
¹ Chehalis River @ Grand Mound	Cascade foothills /Skookumchuck Res/Willapa Hills	201	280	Below Normal
¹ Deschutes River @Rainier	Cascade foothills	22	35	<i>Much</i> below Normal
Black River @128 th Ave SE	Black Hills /Salmon Creek Basin	28	37	Below Normal
¹ Skookumchuck River @Bucoda	Cascade foothills	16	22	<i>Much</i> Below Normal

² McLane Creek @ Delphi Rd	Black Hills	1.8	3.8	Below Normal
² Green Cove Creek @ 36 th Ave NW	West Olympia wetlands	<0.1	>1.5	Lowest recorded
² Woodland Creek @ Pleasant Glade Rd	Lake system -Lacey	11	14	Below Normal
² Percival Creek @ SPSCC	Surface and groundwater	1.8	<3	Below Normal
² Scatter Creek @ Rochester	Scatter Creek Aquifer/ Chehalis River	<dry	0.5	Below normal

*Cfs (cubic feet per second)

¹Indicates Data provided by USGS gauging network

²Data provided by Thurston County Water Resources- Environmental Monitoring Program

The data indicates that Thurston County's larger streams and rivers are adversely impacted by this current drought as of September 1, 2015.

- The Deschutes River and the Skookumchuck Rivers are Much Below Normal
- The Nisqually River and the Chehalis River are also well below normal; the lower reaches are controlled by dams and are manipulated for hydro power and fish flows.
- All creeks measured by Thurston County are below average for this time of year. Green Cove Creek is the lowest recorded level with almost no surface flow.
- In late August, many Western Washington Rivers flowing from the Cascades and the Olympics were at the lowest levels in recorded history because they are directly fed by mountain snowpack.

2 SUMMARY

With Thurston County and Western Washington in a declared severe drought you may think that precipitation levels are to blame. Surprisingly, for Thurston County this is not necessarily the case. Although we are currently behind the average (52 inches) by about 8 inches so far, this is actually not that unusual. 2014 we were above average by almost 10 inches which is also not rare. So droughts are not caused solely by the lack of rain. It is important when this rain is delivered. Winter rains are essential to keeping us green and well-watered and over the past several years our wettest months (November, December and January) have been consistently well below average for rainfall (see above table). This is critical to recharging our streams and wetlands and storing water in the soil. The distribution of rainfall in the fall and spring causes the rain water to be diverted into plant growth and not into recharging our rivers and streams and wetlands so there is not much left by the time our hotter and drier summers arrive.

2015 has been the hottest year on record for Thurston County and most of the Northern hemisphere. For our region 2015 has also been the warmest on record for both winter and summer temperatures. Our winters have been drying out for the past five years with winter precipitation being about fifty percent below average and temperatures being several degrees above average. 2015 was preceded by the second warmest year on record, 2014, and one of the driest summers on record.

The temperature and the lack of winter precipitation have led to low humidity and low soil moisture but the record heat in the spring and summer of 2015 has been the major factor contributing to this current drought. There were almost two dozen days above 90 degrees this summer. In addition, the winter of 2014 -2015 saw 9 days above 60 degrees in February and March not just at the lower elevations but in the mountain passes as well. Although Thurston County has not felt the full effect of lack of mountain snow we have had our share of hot and dry weather. All of our local streams are below normal summer flows.

Air and soil moisture were at record low levels in July and August 2015 and combined with high UV and above average temperatures, it is estimated that one in twenty trees has been damaged or killed by the summer weather extremes in Western Washington. These very dry and hot conditions all around our region are responsible for the largest and most damaging fire season in state history. 2014 was surpassed by 2015 as the worst on record with well over one hundred square miles of forest and shrub lands involved in wildfires. The majority of the fires were east of the Cascades where drought conditions are categorized as Extreme.

As long as the drier warmer winters persist in our region we will be facing the continued threat of droughts. Although Thurston County is not directly reliant on mountain snows for our drinking water supplies it still affects us economically and recreationally. As long as the summer temperatures persistently soar and the humidity drops to record low levels we will continue to see record low river levels and record high fire danger for our region. If the massive and complex computer models are correct, we will continue to see warming into the foreseeable future. Once the climate becomes unstable there is no clear path to plan for in the future.

The science behind atmospheric rivers

An atmospheric river (AR) is a flowing column of condensed water vapor in the atmosphere responsible for producing significant levels of rain and snow, especially in the Western United States. When ARs move inland and sweep over the mountains, the water vapor rises and cools to create heavy precipitation. Though many ARs are weak systems that simply provide beneficial rain or snow, some of the larger, more powerful ARs can create extreme rainfall and floods capable of disrupting travel, inducing mudslides and causing catastrophic damage to life and property. Visit www.research.noaa.gov to learn more.

A strong AR transports an amount of water vapor roughly equivalent to 7.5–15 times the average flow of water at the mouth of the Mississippi River.

ARs are a primary feature in the entire global water cycle and are tied closely to both water supply and flood risks, particularly in the Western U.S.

On average, about 30–50% of annual precipitation on the West Coast occurs in just a few AR events and contributes to the water supply — and flooding risk.

ARs move with the weather and are present somewhere on Earth at any given time.

ARs are approximately 250–375 miles wide on average.

Scientists' improved understanding of ARs has come from roughly a decade of scientific studies that use observations from satellites, radar and aircraft as well as the latest numerical weather models. More studies are underway, including a 2015 scientific mission that added data from instruments aboard a NOAA ship.

WATER
VAPOR
COOLS

CALIFORNIA

Image not to scale.

Appendix B

APPENDIX B – Streamflow Data

This Appendix contains daily streamflow data the streamflow stations that the County operates, monitors and maintains – both under the ILMA and the GEM programs. The Environment Monitoring program is in the process of compiling, calculating, and updating rating curves and flow data, including stream temperature data, for all of our stream sites. This process involves integrating over ten years of continuous 15-minute data from all of the County’s fourteen streamflow stations. We are also generating new rating curves based on the topographic site specific surveys, LiDAR, and manually collected streamflow data and applying these new curve equations to all of our data for each site.

Four of the ten locations have been calculated using a period of record of ten years or more to generate dynamic rating curves and actual flow (Q) values. They are: Woodland Creek at 36th Ave NW (ILMA 20a) and Woodard Creek (ILMA 18a) and Eaton Creek (GEM 10a) and Scatter Creek (GEM 55a). All other streams are presented in this document as *stage in feet*. All streamflow sites will be reported as flow (Q) in future reports.

In 2016 Thurston County acquired software to process all of the new and existing data. In addition we have added technical staff to process the data and provide advanced statistics as well as basic flow metrics for all of our sites.

Future annual reports will also include other types of data processed from all of our sites including; streamflow and stream temperature statistics and common flow statistics used in watershed analysis, engineering, water availability, and fisheries.

All streamflow stations are automated and record instantaneous stage values every fifteen minutes. The intervals match the recording intervals of all of the precipitation and atmospheric monitoring stations. The locations of each station is included in the map in this Appendix.

This Appendix contains the following:

- ◆ **Map of Streamflow locations**

CALCULATED WY 2015 and 2016 Data Tables for the following Streamflow Sites

ILMA Sites as of Sept 30, 2016

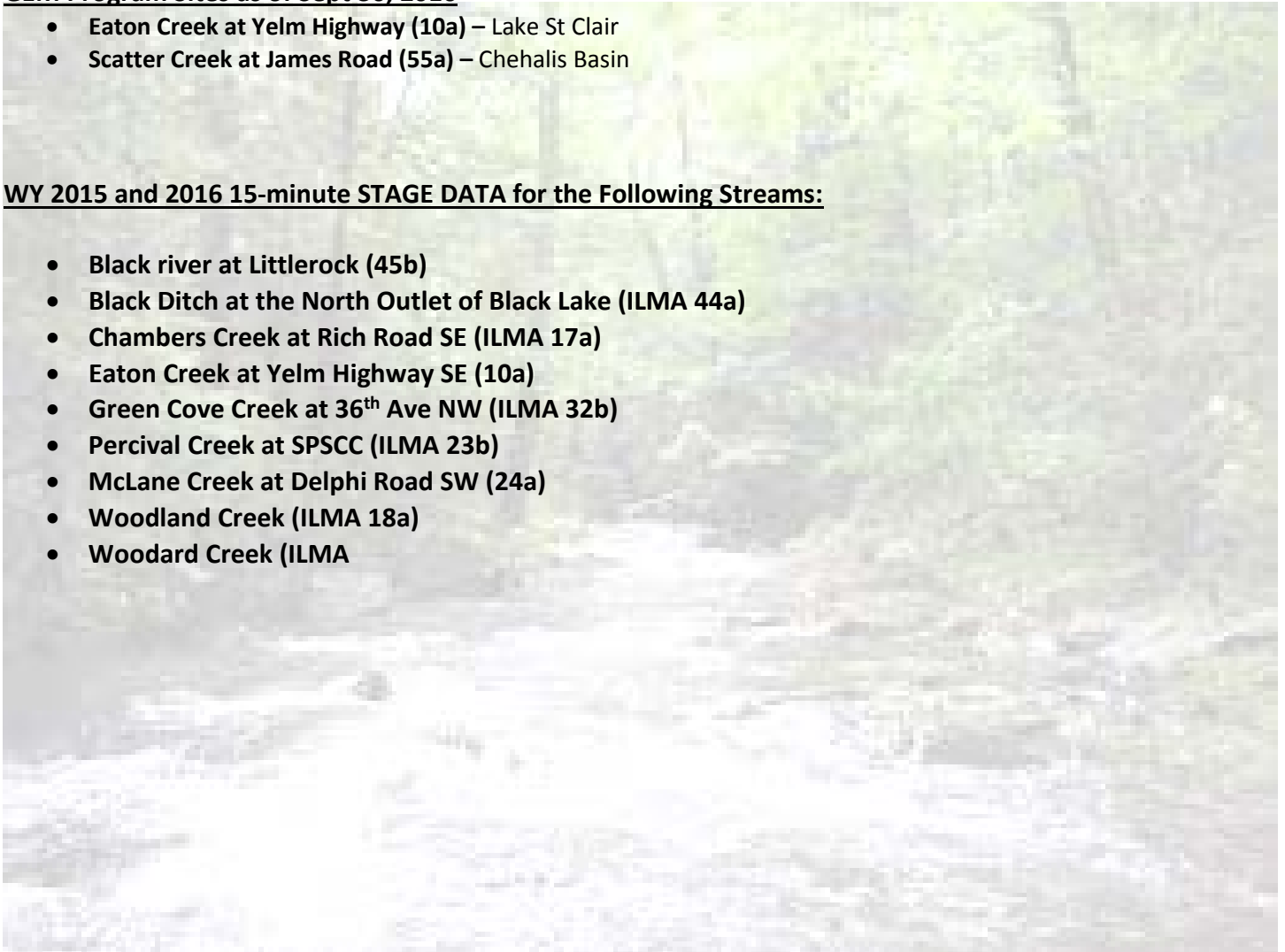
- Woodard Creek at 36th Ave NE (ILMA 20a)
- Woodland Creek at Pleasant Glade Road NE (ILMA 18a)

GEM Program Sites as of Sept 30, 2016

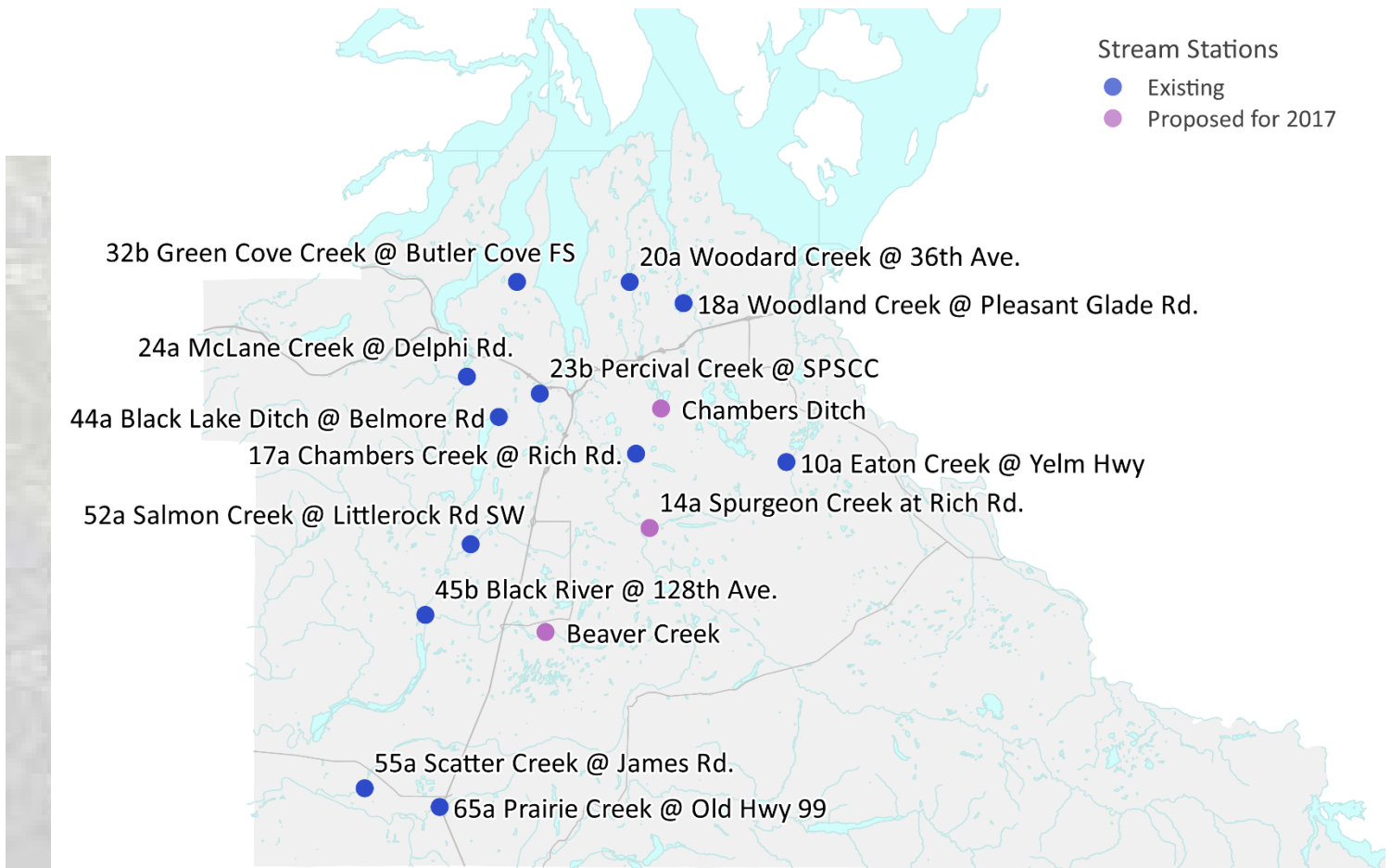
- Eaton Creek at Yelm Highway (10a) – Lake St Clair
- Scatter Creek at James Road (55a) – Chehalis Basin

WY 2015 and 2016 15-minute STAGE DATA for the Following Streams:

- Black river at Littlerock (45b)
- Black Ditch at the North Outlet of Black Lake (ILMA 44a)
- Chambers Creek at Rich Road SE (ILMA 17a)
- Eaton Creek at Yelm Highway SE (10a)
- Green Cove Creek at 36th Ave NW (ILMA 32b)
- Percival Creek at SPSCC (ILMA 23b)
- McLane Creek at Delphi Road SW (24a)
- Woodland Creek (ILMA 18a)
- Woodard Creek (ILMA



Map of Streamflow Monitoring Sites in Thurston County – (Existing and future locations)



The map above provides the locations of all current (dark blue) and proposed (purple) streamflow monitoring sites in Thurston County as of 2017.

Summary Report and Analysis of Water Years 2015 – 2016 including: Atmospheric, Streamflow, Groundwater and Lake Level
Data –Thurston County Environmental Monitoring Program

Calculated Flow Data Tables for:

- 10a Eaton Creek WY 2015 and 2016
- 55a Scatter Creek WY 2015 – 2016 partial
- 18a Woodland Creek WY 2015 – 2016
- 20a Woodard Creek WY 2015 - 2016



Automated *Stage* Data (15- minute) for:

- Black river at Littlerock (45b)
- Black Ditch at the North Outlet of Black Lake (ILMA 44a)
- Chambers Creek at Rich Road SE (ILMA 17a)
- Eaton Creek at Yelm Highway SE (10a)
- Green Cove Creek at 36th Ave NW (ILMA 32b)
- Percival Creek at SPSCC (ILMA 23b)
- McLane Creek at Delphi Road SW (24a)
- Woodland Creek (ILMA 18a)
- Woodard Creek (ILMA 20a)



10a--Eaton Creek @ Yelm Hwy

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	6.9	33	5.3	5.3	7.9	9.9	13	7.1	7.7	5.8	6.8	13
02	5.7	25	5.2	5.3	9.4	9.9	13	6.6	8.0	5.8	6.6	14
03	5.6	22	5.2	5.4	9.6	6.6	11	6.6	7.8	5.8	7.4	11
04	5.9	22	5.3	7.5	9.3	6.1	11	6.0	6.5	6.0	7.7	11
05	5.7	20	5.3	28	22	6.3	9.9	7.0	6.2	6.5	7.0	7.9
06	5.9	23	5.4	25	30	6.5	11	7.4	6.1	5.8	7.0	8.5
07	6.1	22	5.4	23	29	6.4	11	6.2	5.9	6.3	6.2	8.6
08	6.2	20	5.3	15	31	6.7	11	6.2	5.9	5.8	6.5	8.4
09	6.7	20	5.6	8.8	31	6.6	11	5.7	6.3	5.8	6.0	10
10	6.1	18	15	8.7	25	7.3	10	5.8	6.4	5.9	6.2	8.7
11	5.7	12	18	7.7	20	7.2	21	6.5	6.6	5.8	6.3	8.4
12	5.9	9.1	17	6.9	17	8.3	18	8.2	6.2	5.9	6.2	8.7
13	5.8	8.8	10.0	6.1	14	7.5	16	10	6.2	6.2	5.8	9.5
14	11	6.6	6.3	5.8	13	21	15	11	5.9	6.0	6.9	9.7
15	12	5.9	5.4	6.0	9.7	33	13	7.3	5.8	5.9	6.7	8.6
16	11	5.8	5.4	12	11	34	12	6.3	6.5	5.5	5.8	9.3
17	10	5.8	5.3	12	9.1	28	12	6.3	6.3	5.6	5.5	10
18	8.9	6.0	5.4	27	8.5	19	12	6.0	6.2	5.6	5.7	9.6
19	7.6	6.4	5.5	24	9.3	12	11	6.0	5.7	5.7	5.7	9.3
20	9.6	8.6	7.3	18	9.2	10	11	8.0	5.5	5.8	6.1	8.7
21	13	9.6	18	9.6	7.9	13	11	8.6	5.6	7.6	6.6	8.1
22	17	17	15	9.4	6.1	13	8.4	8.8	5.5	9.3	5.7	5.9
23	27	20	12	10	6.1	12	7.9	8.4	5.5	9.1	5.8	5.8
24	26	12	17	16	6.2	19	11	8.5	5.6	8.9	5.9	6.1
25	25	13	13	13	6.5	20	14	8.6	5.5	8.1	5.7	6.9
26	26	16	8.8	9.7	7.5	18	11	8.7	5.9	8.3	6.6	7.1
27	20	14	8.4	10.0	21	15	8.9	7.6	5.8	8.3	6.7	6.5
28	19	15	7.4	9.4	20	15	10	7.1	5.8	7.5	7.0	6.2
29	21	14	5.7	9.4		12	7.7	7.1	6.1	6.8	10	6.4
30	21	6.1	5.3	7.7		12	7.0	6.9	6.1	7.1	21	5.9
31	36		5.3	7.6		13		6.6		7.1	16	

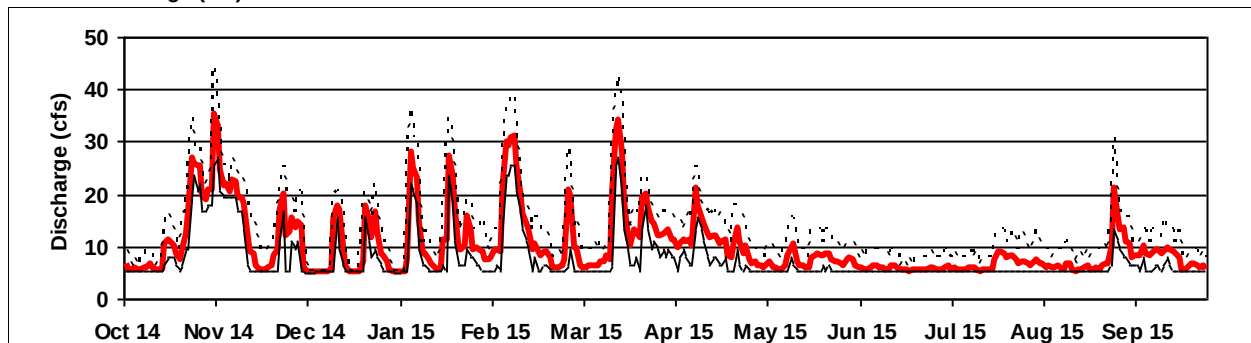
Avg Discharge	13	15	8.5	12	15	13	12	7.3	6.2	6.6	7.3	8.6
Max Instantaneous	45	37	22	37	39	43	25	16	11	13	31	17
Max Mean Daily	36	33	18	28	31	34	21	11	8.0	9.3	21	14

Average Discharge for Water Year 2015:	10	Low Flow (Cal Year)--7 day	5.59	06/22/15	--30 day	5.82	07/05/15		
Lowest Stage:	0.95	Discharge:	5.04	12/02/14	Metrics	High Pulse Count	6	Range	143 Days
Peak Inst Stage:	1.26	Discharge:	44.8	10/31/14	TQ Mean (Use Daily Avg)	0.32	R-B Index	0.16	
Discharge is determined by comparing continuous stage records with field flow measurements.									

Discharge is determined by comparing continuous stage records with field flow measurements.

Thurston County

Annual Discharge (cfs)-- Mean — Max ---- Min —



04/25/17 11:02:40 AM by Nat Kalen

10a--Eaton Creek @ Yelm Hwy

Water Year: 2016

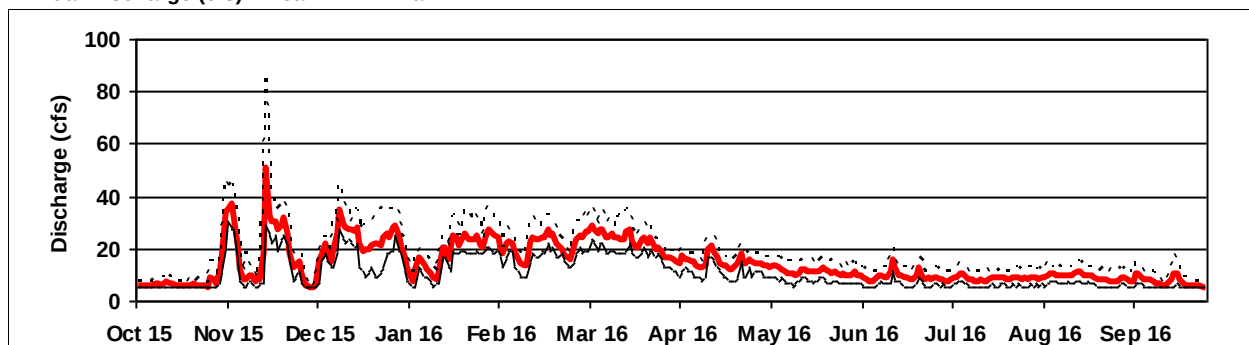
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	6.0	35	5.8	13	24	24	16	14	10	8.5	8.9	8.9
02	5.7	37	16	11	20	27	15	14	11	8.4	9.3	9.2
03	5.9	32	17	8.0	18	27	14	13	10	7.7	9.1	8.6
04	5.9	21	22	12	22	29	18	13	9.9	7.9	8.7	8.0
05	6.0	12	18	17	23	28	16	14	9.1	8.4	9.1	7.9
06	5.9	8.4	16	16	22	26	16	13	8.3	9.0	8.9	11
07	6.7	8.1	20	14	19	27	15	13	8.0	9.1	10	11
08	7.2	9.6	26	12	16	28	15	12	7.9	11	11	9.1
09	6.4	10.0	35	11	15	25	14	11	8.2	11	11	8.4
10	6.6	7.3	30	9.0	13	24	13	11	9.6	9.4	10	8.2
11	7.8	9.8	28	8.6	14	26	13	11	10	8.5	10	8.1
12	7.0	8.7	28	12	23	25	14	10	9.4	8.4	9.8	7.3
13	7.2	19	27	21	25	24	20	10	9.3	7.9	9.8	6.5
14	6.4	51	27	20	23	24	21	11	12	7.8	10	6.5
15	6.4	33	28	16	24	24	19	12	16	8.1	10	6.2
16	6.0	31	22	20	24	27	16	13	13	7.8	11	6.3
17	6.1	31	19	25	24	28	15	11	10	7.9	11	7.0
18	5.9	27	20	24	28	23	14	11	10	8.5	11	8.6
19	6.4	29	20	21	25	21	13	12	9.3	8.9	10	11
20	6.7	32	22	24	26	21	12	12	8.8	8.8	10	10
21	6.1	26	22	26	22	23	12	12	8.6	8.8	9.9	8.4
22	6.2	18	22	24	22	24	14	13	8.5	9.4	9.6	7.1
23	6.0	13	22	24	20	22	14	12	9.8	9.1	9.0	6.4
24	5.9	14	24	24	18	24	18	11	13	8.7	8.3	6.4
25	5.7	15	26	25	17	23	15	11	9.4	8.5	8.3	6.3
26	9.4	10	24	22	16	20	15	11	8.7	9.2	8.5	5.9
27	8.7	6.5	28	21	22	21	16	11	8.8	9.3	8.1	5.8
28	6.7	5.7	29	26	24	19	15	9.9	8.5	8.9	7.9	5.8
29	11	5.5	25	27	25	17	15	11	9.4	8.6	7.9	5.6
30	18	5.4	21	26		17	14	10	8.9	8.9	8.0	5.7
31	34		16	25		17		9.6		8.6	7.9	

Avg Discharge	7.9	19	23	19	21	24	15	12	9.8	8.7	9.5	7.7
Max Instantaneous	47	87	45	37	33	37	25	18	21	16	16	18
Max Mean Daily	34	51	35	27	28	29	21	14	16	11	11	11

Average Discharge for Water Year 2016:	15	Low Flow (Cal Year)--7 day	5.67	10/01/16	--30 day	6.95	09/24/16		
Lowest Stage:	1.02	Discharge:	5.33	11/30/15	Metrics	High Pulse Count	12	Range	145 Days
Peak Inst Stage:	1.43	Discharge:	87.29	11/14/15	TQ Mean (Use Daily Avg)	0.39	R-B Index	0.11	
Discharge is determined by comparing continuous stage records with field flow measurements.									

Thurston County

Annual Discharge (cfs)-- Mean — Max ---- Min —



04/25/17 11:02:57 AM by Nat Kalen

18a--Woodland Creek @ Pleasant Glade Rd.

Water Year: 2015

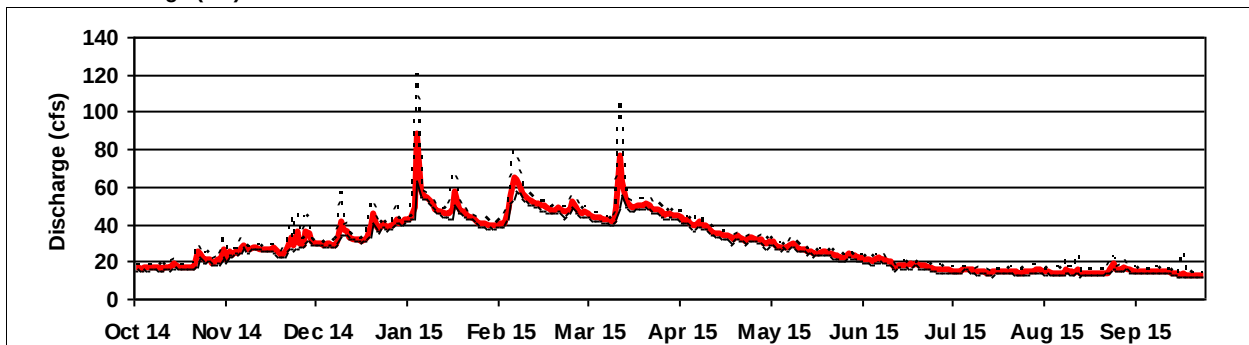
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	17	22	30	43	39	47	46	32	24	16	15	16
02	17	25	30	43	41	46	45	32	23	16	15	16
03	17	24	30	43	40	47	45	30	23	16	15	17
04	17	26	29	49	41	46	45	30	22	16	16	16
05	17	25	29	89	49	45	44	31	22	16	16	16
06	17	28	30	59	56	44	42	31	22	15	15	15
07	17	29	29	56	66	44	42	29	21	15	15	15
08	17	27	29	54	64	44	40	28	21	15	15	15
09	17	27	31	53	60	43	39	28	20	15	14	15
10	16	27	42	51	57	43	40	28	21	16	14	15
11	17	27	37	49	55	43	42	27	22	16	14	15
12	17	27	36	47	54	42	39	29	22	16	14	15
13	17	27	34	47	52	42	40	30	21	16	14	15
14	19	27	32	46	51	49	39	28	20	15	17	15
15	18	27	32	46	51	77	37	27	20	15	15	15
16	17	27	32	45	50	63	36	27	19	15	15	14
17	17	27	31	48	50	54	36	26	17	15	14	15
18	17	26	32	58	49	51	36	26	18	14	16	14
19	17	25	33	49	48	49	34	26	18	14	14	14
20	18	24	39	47	47	49	34	25	18	14	14	14
21	17	26	46	47	48	51	34	24	18	15	14	14
22	25	28	39	44	49	50	33	25	19	15	14	13
23	25	33	37	44	48	50	32	25	19	15	14	14
24	21	28	40	44	47	52	34	25	19	15	14	12
25	22	37	39	42	47	51	33	25	18	15	14	13
26	22	30	39	40	48	48	32	24	18	15	14	13
27	19	29	40	40	53	48	31	23	18	15	14	13
28	20	36	40	41	49	48	33	23	18	14	14	13
29	22	35	43	39		47	33	23	17	14	16	13
30	20	31	41	39		45	33	22	16	14	19	13
31	27		42	39		46		23		15	16	
Avg Discharge	19	28	35	48	50	49	38	27	20	15	15	14
Max Instantaneous	33	46	58	121	80	106	48	34	26	18	25	25
Max Mean Daily	27	37	46	89	66	77	46	32	24	16	19	17

Average Discharge for Water Year 2015:		30	Low Flow (Cal Year)--7 day	11.5	10/22/15	--30 day	12.2	10/11/15	
Lowest Stage:	0.62	Discharge:	11.44	09/24/15	Metrics	High Pulse Count	3	Range	69 Days
Peak Inst Stage:	1.89	Discharge:	120.56	01/05/15	TQ Mean (Use Daily Avg)	0.44	R-B Index	0.05	
Discharge is determined by comparing continuous stage records with field flow measurements.									

Discharge is determined by comparing continuous stage records with field flow measurements.

Thurston County

Annual Discharge (cfs)-- Mean █ Max ---- Min ---



04/25/17 11:04:28 AM by Nat Kalen

18a--Woodland Creek @ Pleasant Glade Rd.

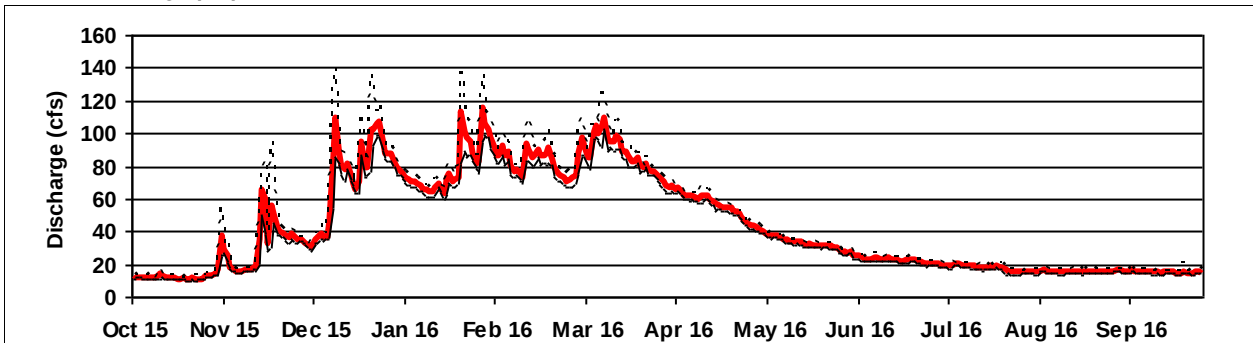
Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	13	30	31	75	91	88	68	43	27	21	16	17
02	13	26	36	73	86	98	69	42	28	21	16	17
03	13	19	36	72	86	92	66	41	26	20	16	16
04	13	17	40	71	93	85	67	39	26	20	16	16
05	12	16	37	71	87	85	65	38	25	20	16	16
06	12	16	37	70	89	101	63	38	24	20	16	17
07	12	16	47	68	81	105	62	37	23	20	17	16
08	12	17	85	66	77	100	62	37	23	20	16	16
09	12	17	110	65	78	105	62	36	23	20	16	16
10	14	17	87	64	76	110	61	36	24	20	16	16
11	13	18	80	65	74	96	60	35	24	20	16	16
12	12	18	79	67	93	96	63	35	23	20	16	16
13	12	36	82	69	91	95	62	34	24	19	16	16
14	12	66	75	66	86	99	63	34	24	19	16	15
15	12	60	70	64	87	97	60	34	24	19	16	15
16	12	33	66	73	90	90	59	34	23	19	16	15
17	11	56	71	76	87	89	57	33	23	18	16	15
18	12	52	96	70	87	87	56	32	23	18	16	15
19	11	43	79	72	88	83	56	32	23	18	16	15
20	12	41	79	74	91	83	55	32	22	19	16	15
21	12	39	103	113	84	85	54	32	23	19	16	15
22	11	37	102	101	80	81	55	31	23	19	16	15
23	11	37	106	98	75	79	53	31	24	19	16	15
24	11	39	108	95	75	82	52	32	23	18	16	15
25	12	37	95	87	73	78	51	32	22	17	16	15
26	13	35	87	82	71	77	49	31	22	16	16	15
27	13	35	88	83	72	76	46	31	21	16	16	15
28	13	34	88	117	74	74	45	30	21	16	16	15
29	14	33	82	106	74	73	44	29	21	15	16	15
30	17	32	79	102		70	44	28	21	16	16	15
31	38		77	98		69		28		16	16	
Avg Discharge	13	32	75	80	83	88	58	34	23	19	16	16
Max Instantaneous	54	96	140	138	109	126	72	45	30	22	19	22
Max Mean Daily	38	66	110	117	93	110	69	43	28	21	17	17

Average Discharge for Water Year 2016:	45	Low Flow (Cal Year)--7 day	15.1	09/24/16	--30 day	15.4	09/22/16		
Lowest Stage:	0.61	Discharge:	9.99	10/20/15	Metrics	High Pulse Count	3	Range	150 Days
Peak Inst Stage:	2.05	Discharge:	140.19	12/09/15	TQ Mean (Use Daily Avg)	0.40	R-B Index	0.06	
Discharge is determined by comparing continuous stage records with field flow measurements.									

Thurston County

Annual Discharge (cfs)-- Mean — Max ---- Min —



04/25/17 11:04:48 AM by Nat Kalen

20a--Woodard Creek @ 36th Ave.

Water Year: 2015

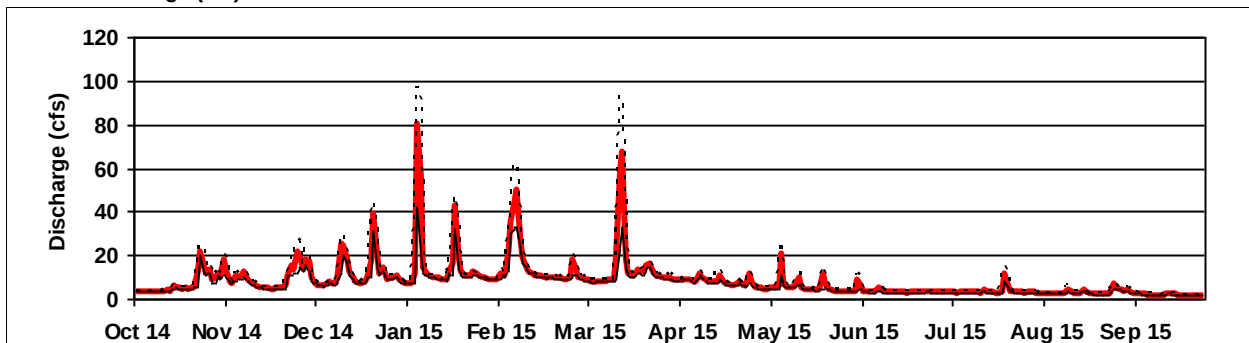
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	3.9	14	7.5	7.6	9.2	10	10	5.3	4.0	3.5	3.5	5.0
02	3.7	8.4	6.8	7.6	12	9.8	9.6	5.1	4.1	3.5	3.4	4.7
03	3.7	7.7	6.4	7.7	12	9.0	9.2	4.8	3.9	3.5	3.2	3.8
04	3.7	11	6.3	12	11	8.7	9.2	4.8	9.2	3.4	3.1	4.9
05	3.6	10	6.9	81	22	8.5	9.0	5.2	6.1	3.3	3.0	3.4
06	3.6	11	7.8	57	36	8.4	9.3	5.3	4.1	3.3	3.0	3.2
07	3.6	13	7.4	15	44	8.4	9.4	5.4	3.7	3.3	3.0	3.0
08	3.7	9.0	7.2	12	50	8.5	9.1	6.6	3.6	3.2	2.9	2.6
09	3.7	7.9	10	11	28	8.6	8.4	21	3.6	3.3	2.9	2.5
10	3.7	7.6	26	10	19	8.4	8.7	7.5	3.5	3.3	2.9	2.3
11	3.8	6.4	25	10	15	8.8	12	5.7	5.3	3.3	2.8	2.3
12	4.5	5.8	18	9.9	13	9.0	11	5.7	4.5	3.5	2.7	2.2
13	4.1	5.6	13	9.4	12	8.8	9.3	5.8	3.6	3.5	2.8	2.3
14	6.3	5.3	9.8	9.1	11	20	8.2	6.0	3.3	3.4	3.5	2.2
15	5.7	5.2	7.9	9.4	11	58	8.2	9.9	3.3	3.2	4.9	2.1
16	5.1	5.0	7.2	13	11	67	7.9	6.0	3.3	3.2	3.3	2.1
17	4.7	5.0	7.6	16	10	19	8.7	5.0	3.3	4.2	3.1	3.1
18	5.1	5.2	7.9	43	10.0	12	11	4.7	3.3	3.6	2.9	2.8
19	4.7	5.2	10	19	10	11	8.4	4.7	3.4	3.3	2.9	2.5
20	5.1	5.2	17	13	10	11	7.7	4.8	3.3	3.3	4.2	2.3
21	5.7	6.6	39	11	10.0	13	7.2	4.6	3.2	3.2	3.4	2.1
22	13	11	21	11	9.8	13	6.6	4.5	3.4	3.1	2.8	1.9
23	22	16	12	11	9.6	13	6.8	12	3.4	3.8	2.7	1.8
24	16	14	15	12	9.3	16	7.6	7.1	3.4	12	2.6	1.9
25	12	22	12	12	9.3	16	7.9	4.8	3.4	6.0	2.4	2.0
26	13	20	9.6	11	9.9	14	6.7	4.3	3.4	4.1	2.4	2.3
27	9.3	14	9.9	10	19	11	6.5	4.0	3.4	3.7	2.3	2.0
28	10	19	10	9.7	14	11	12	4.0	3.5	3.4	2.4	1.9
29	12	17	11	9.2		10	8.3	4.1	3.4	3.3	2.9	1.9
30	9.9	9.9	9.1	9.0		9.7	5.8	4.0	3.4	3.2	6.9	1.9
31	18		8.1	9.2		10.0		3.9		3.2	5.0	
Avg Discharge	7.3	10	12	16	16	15	8.7	6.0	3.9	3.8	3.2	2.6
Max Instantaneous	26	28	45	98	62	93	15	27	12	15	8.3	5.8
Max Mean Daily	22	22	39	81	50	67	12	21	9.2	12	6.9	5.0

Average Discharge for Water Year 2015:	8.6	Low Flow (Cal Year)--7 day	1.95	09/26/15	--30 day	2.15	09/25/15		
Lowest Stage:	0.96	Discharge:	1.58	09/28/15	Metrics	High Pulse Count	10	Range	198 Days
Peak Inst Stage:	2.77	Discharge:	97.78	01/05/15	TQ Mean (Use Daily Avg)	0.39	R-B Index	0.27	
Discharge is determined by comparing continuous stage records with field flow measurements.									

Discharge is determined by comparing continuous stage records with field flow measurements.

Thurston County

Annual Discharge (cfs)-- Mean █ Max ---- Min —



04/25/17 11:01:19 AM by Nat Kalen

20a--Woodard Creek @ 36th Ave.

Water Year: 2016

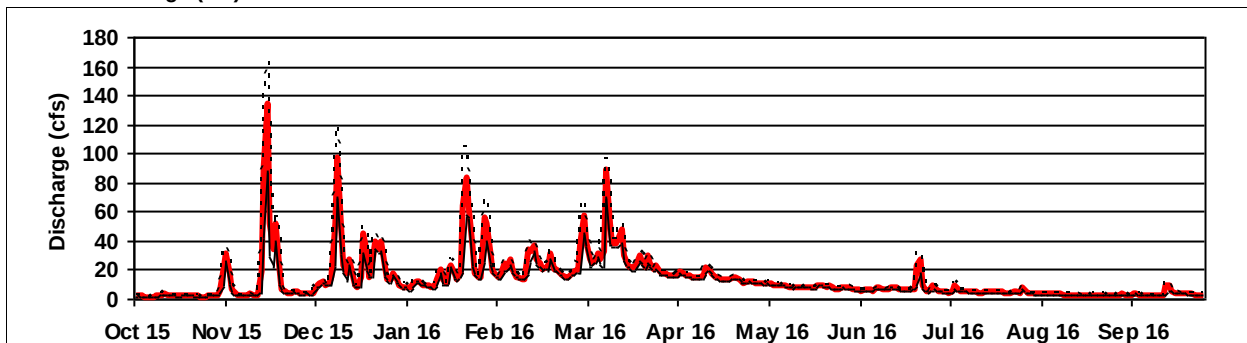
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	2.4	32	4.6	8.6	16	38	17	11	8.3	5.5	4.7	3.4
02	2.3	18	10	8.3	15	58	16	11	7.3	6.1	4.2	3.6
03	2.1	6.3	11	7.7	16	39	16	11	6.7	5.3	3.9	3.4
04	1.9	3.5	12	11	25	27	20	11	6.3	5.1	3.6	3.2
05	1.8	3.2	10	13	22	25	18	11	6.1	4.8	3.6	3.2
06	1.8	2.8	11	12	27	28	17	10	6.2	4.9	3.5	3.7
07	2.1	2.7	15	10	20	32	16	9.9	6.2	9.7	3.5	3.7
08	2.2	3.2	52	9.5	16	27	16	10	6.2	6.7	3.6	3.4
09	2.2	3.8	97	9.2	14	32	15	9.8	5.9	6.0	3.6	3.1
10	3.0	2.7	48	8.6	14	89	15	9.2	7.7	5.9	3.6	2.9
11	4.0	3.2	24	9.0	14	53	15	8.8	7.9	5.4	3.6	2.9
12	2.8	2.9	18	14	34	39	16	8.5	7.2	5.0	3.5	2.8
13	2.7	19	27	20	33	38	23	8.0	6.8	5.0	3.4	2.7
14	2.4	91	16	14	37	41	21	8.3	7.2	5.0	3.4	2.7
15	2.3	135	9.5	11	27	48	18	8.4	8.3	4.7	3.4	2.7
16	2.3	52	8.6	21	25	31	15	8.5	7.8	4.7	3.3	2.7
17	3.0	34	15	24	20	24	15	8.5	8.0	4.8	3.2	9.3
18	2.7	52	46	17	22	22	14	8.2	6.8	5.3	3.1	9.1
19	2.5	20	32	14	23	21	14	8.0	6.2	5.1	3.0	5.6
20	2.4	7.0	16	18	32	24	14	8.0	6.5	4.9	3.1	4.8
21	2.2	4.9	28	65	21	30	14	9.0	6.7	4.9	3.2	4.1
22	2.1	4.6	40	84	21	27	15	9.6	6.5	4.8	3.1	4.0
23	1.9	4.5	35	63	18	23	15	9.0	7.5	4.9	3.2	3.9
24	2.0	5.5	39	36	16	30	14	8.9	23	4.6	3.3	4.1
25	2.0	5.0	22	18	15	25	13	9.0	28	4.4	3.2	3.8
26	2.7	4.0	13	15	15	21	12	7.8	9.7	4.4	3.2	3.5
27	2.5	3.9	13	15	18	24	12	7.4	5.9	5.2	3.3	3.4
28	2.4	4.1	18	56	19	19	12	7.2	5.1	4.9	3.1	3.4
29	3.3	4.0	14	52	21	17	12	7.8	9.5	4.4	3.0	3.2
30	5.4	3.7	10	31		17	12	8.3	8.2	8.5	3.0	3.1
31	21		8.8	19		17		8.3		5.5	3.1	
Avg Discharge	3.1	18	23	23	21	32	15	9.1	8.3	5.4	3.4	3.8
Max Instantaneous	32	164	120	104	42	98	26	12	33	12	5.5	14
Max Mean Daily	21	135	97	84	37	89	23	11	28	9.7	4.7	9.3

Average Discharge for Water Year 2016:	14	Low Flow (Cal Year)--7 day	2.78	09/13/16	--30 day	3.14	09/02/16		
Lowest Stage:	0.95	Discharge:	1.58	10/05/15	Metrics	High Pulse Count	16	Range	237 Days
Peak Inst Stage:	3.37	Discharge:	164.19	11/15/15	TQ Mean (Use Daily Avg)	0.36	R-B Index	0.30	
Discharge is determined by comparing continuous stage records with field flow measurements.									

Discharge is determined by comparing continuous stage records with field flow measurements.

Thurston County

Annual Discharge (cfs)-- Mean — Max ---- Min —



04/25/17 11:01:51 AM by Nat Kalen

55a--Scatter Creek @ James Rd.

Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.00	0.00	14	55	64	61	67	21	3.1	0.35	0.72	1.1
02	0.00	0.00	14	51	60	59	63	20	3.3	0.38	0.72	0.82
03	0.00	0.00	12	47	57	55	63	19	3.1	0.72	0.71	0.68
04	0.00	0.00	9.6	46	55	51	62	18	2.7	0.72	0.70	1.0
05	0.00	0.00	6.2	166	60	48	59	17	2.6	0.72	0.71	0.83
06	0.00	0.00	4.7	286	75	45	57	16	2.5	0.71	0.71	0.79
07	0.00	0.00	2.9	273	127	42	53	15	2.6	0.71	0.71	0.90
08	0.00	0.00	2.3	227	208	41	50	14	2.4	0.71	0.69	0.74
09	0.00	0.00	2.3	194	235	39	47	14	2.6	0.71	0.82	0.62
10	0.00	0.00	6.4	169	219	37	45	13	3.6	0.71	0.78	0.68
11	0.00	0.00	12	150	197	36	46	12	1.3	0.72	0.68	0.67
12	0.00	0.00	19	127	179	34	44	12	1.4	0.71	0.73	0.69
13	0.00	0.00	29	108	163	33	44	12	1.4	0.72	0.72	0.68
14	0.00	0.00	35	93	149	37	43	12	1.4	0.72	0.72	0.69
15	0.00	0.00	36	83	130	56	41	11	1.6	0.72	0.86	0.69
16	0.00	0.01	34	78	114	90	39	10	1.2	0.72	1.0	0.68
17	0.00	0.00	31	77	101	171	38	9.6	1.1	0.72	0.92	0.68
18	0.00	0.00	28	102	91	167	35	8.2	1.3	0.73	0.82	0.68
19	0.00	0.00	28	114	83	142	34	7.3	1.1	0.72	0.85	0.68
20	0.00	0.00	30	150	77	117	33	6.4	1.3	0.71	0.91	1.1
21	0.00	0.00	44	144	72	103	32	6.1	1.1	0.71	0.88	1.0
22	0.00	0.00	51	128	67	90	30	5.6	1.1	0.72	0.97	0.98
23	0.00	0.13	89	114	62	86	29	5.0	1.1	0.72	1.0	0.83
24	0.00	0.38	99	113	58	85	30	4.9	0.91	0.72	1.0	0.53
25	0.00	0.56	89	103	55	86	28	5.2	0.94	0.72	0.93	0.68
26	0.00	0.75	84	101	53	90	27	5.0	0.93	0.72	0.94	0.68
27	0.00	0.59	79	95	55	93	26	4.5	1.0	0.72	0.92	0.68
28	0.00	0.61	75	86	57	89	24	4.2	0.94	0.72	0.88	0.67
29	0.00	0.90	69	79		82	23	3.6	0.83	0.71	1.2	0.67
30	0.00	5.8	65	73		76	22	3.1	0.75	0.72	4.0	0.67
31	0.00		60	68		72		2.8		0.72	2.1	

Avg Discharge	0.00	0.32	37	119	104	75	41	10	1.7	0.69	0.98	0.76
Max Instantaneous	0.00	12	102	322	239	182	69	22	9.3	0.76	6.9	1.4
Max Mean Daily	0.00	5.8	99	286	235	171	67	21	3.6	0.73	4.0	1.1

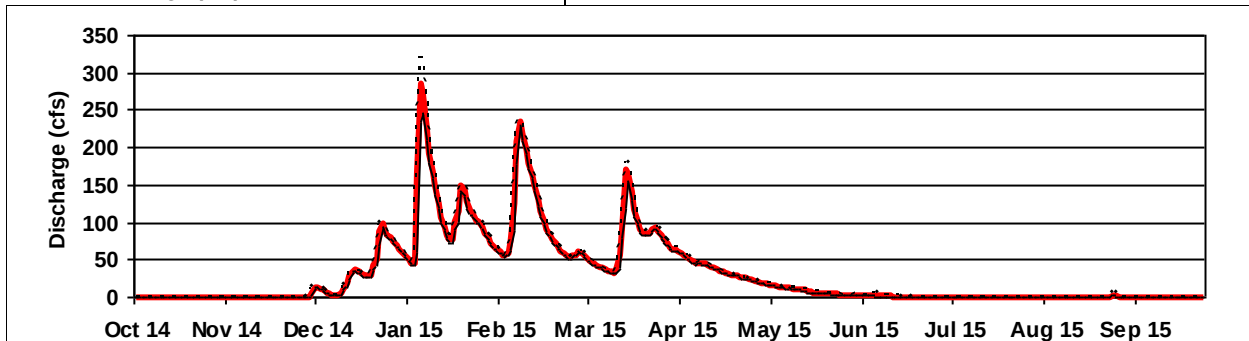
Average Discharge for Water Year 2015:		33	Low Flow (Cal Year)--7 day		0.62	07/04/15	--30 day	0.67	10/16/15
Lowest Stage:	0.03	Discharge:	0	10/01/14	Metrics	High Pulse Count	5	Range	83 Days
Peak Inst Stage:	4.63	Discharge:	322.24	01/06/15	TQ Mean (Use Daily Avg)		0.34	R-B Index	0.13

Discharge is determined by comparing continuous stage records with field flow measurements.

Thurston County

In June 2015, stream is choked with filamentous algae, almost dry.
The summer was very dry.

Annual Discharge (cfs)-- Mean — Max ---- Min —



55a--Scatter Creek @ James Rd.

Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	0.67	9.6	37	166	210							
02	0.67	13	39	155	196							
03	0.67	12	40	143	183							
04	0.67	2.4	44	133	176							
05	0.67	1.0	46	124	169							
06	0.67	0.78	55	117	164							
07	0.67	0.57	71	109	157							
08	0.68	0.66	122	100	152							
09	0.68	0.70	249	92	143							
10	0.68	0.73	313	85	132							
11	0.68	0.63	288	80	123							
12	0.67	0.66	265	79	129							
13	0.67	4.3	249	85	129							
14	0.67	69	233	82	152							
15	0.67	83	218	84	183							
16	0.67	239	201	92	204							
17	0.68	248	194	97								
18	0.67	259	213	107								
19	0.67	276	248	121								
20	0.67	232	265	133								
21	0.67	192	260	170								
22	0.67	157	271	216								
23	0.67	125	281	234								
24	0.67	101	295	229								
25	0.66	81	299	217								
26	0.67	67	275	199								
27	0.67	59	250	182								
28	0.67	50	229	185								
29	0.67	44	212	204								
30	0.67	39	196	227								
31	3.5		179	222								

Avg Discharge 0.76 79 198 144 163

Max Instantaneous 11 289 321 237 218

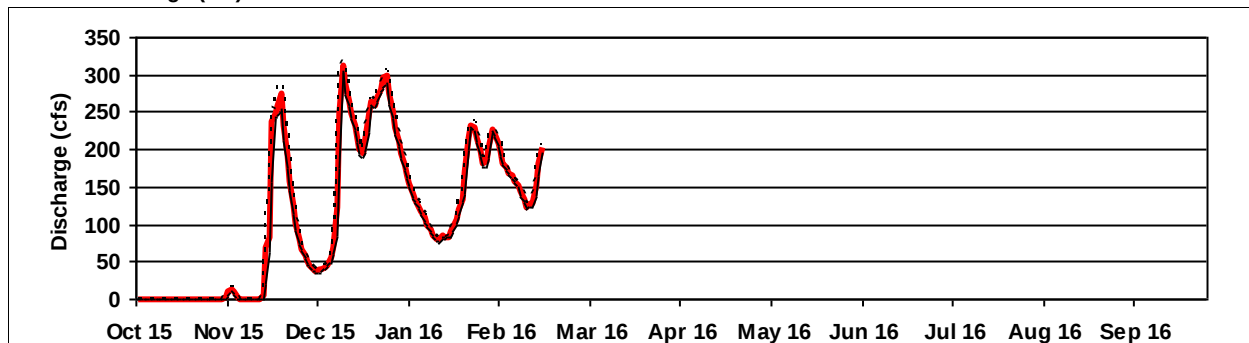
Max Mean Daily 3.5 276 313 234 210

Average Discharge for Water Year 2016:	117	Low Flow (Cal Year)--7 day	83.9	01/13/16	--30 day	140	01/14/16		
Lowest Stage:	0.56	Discharge:	0.47	11/07/15	Metrics	High Pulse Count	3	Range	62 Days
Peak Inst Stage:	4.63	Discharge:	321.34	12/10/15	TQ Mean (Use Daily Avg)	0.48	R-B Index	0.11	
Discharge is determined by comparing continuous stage records with field flow measurements.									

Discharge is determined by comparing continuous stage records with field flow measurements.

Thurston County

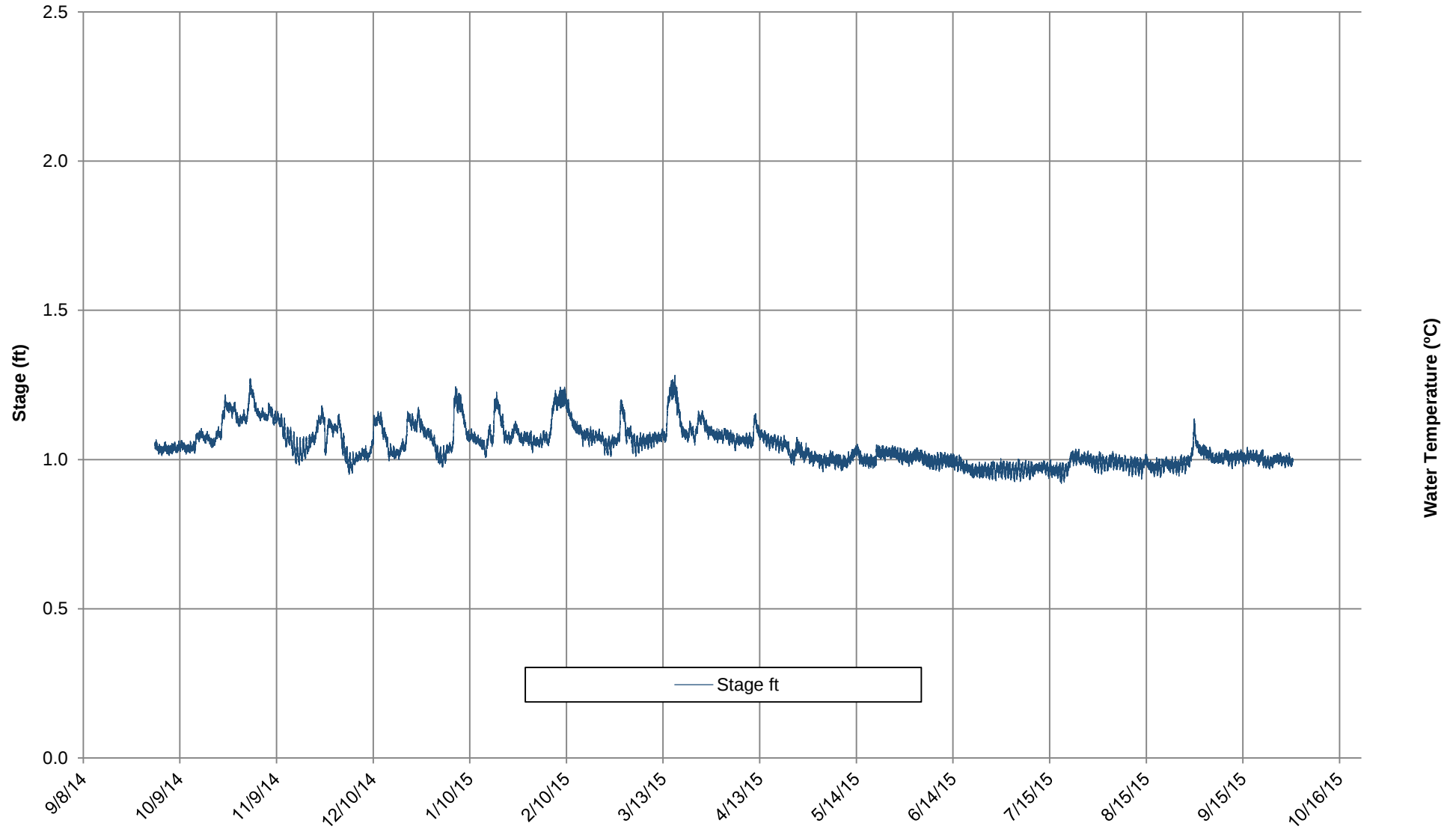
Annual Discharge (cfs)-- Mean — Max ---- Min —



04/25/17 11:14:54 AM by Nat Kalen

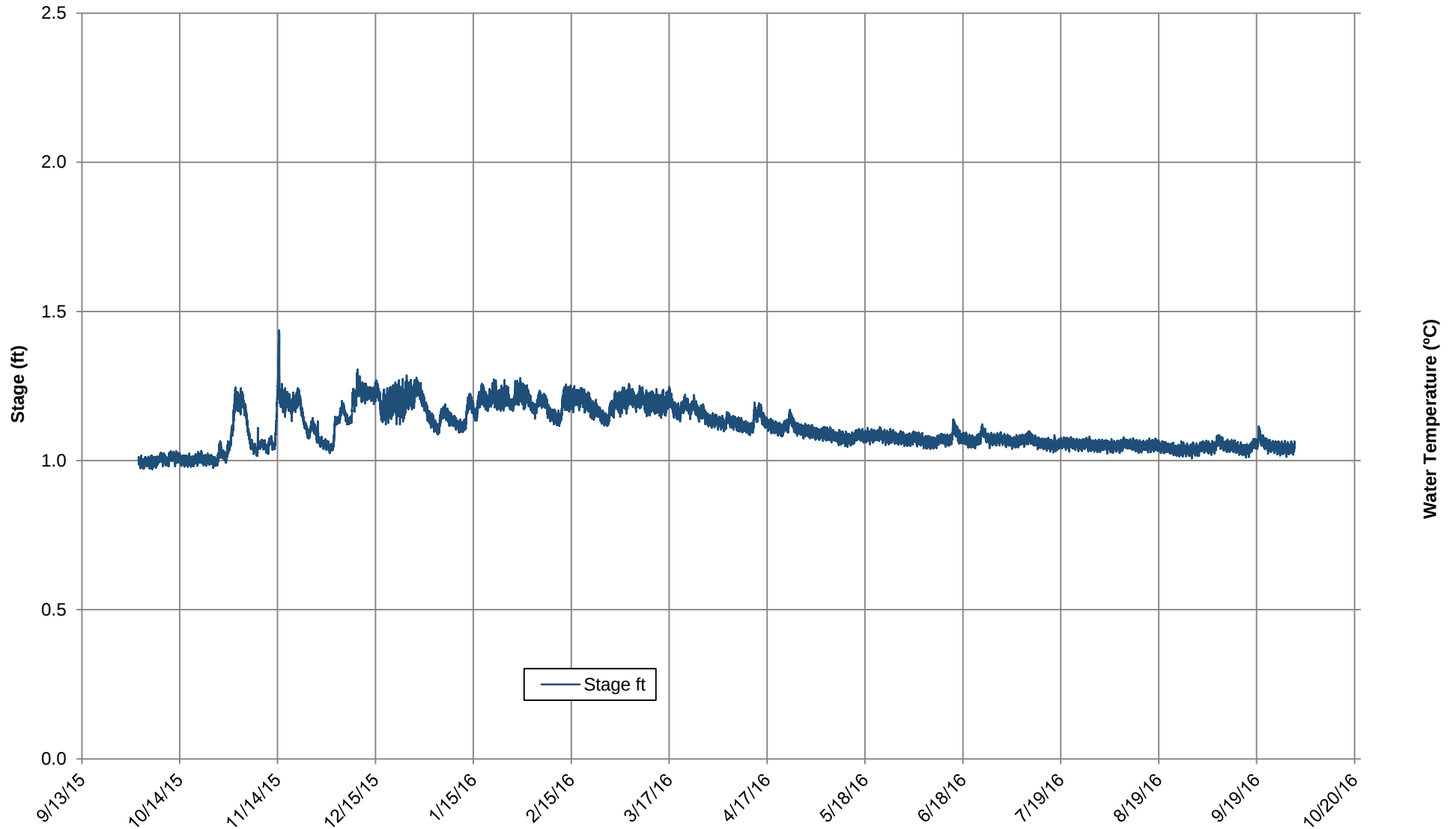
Summary Report and Analysis of Water Year 2015 - 2016
Streamflow

**10a Eaton Creek at Yelm Highway
WY 2015 Stage**

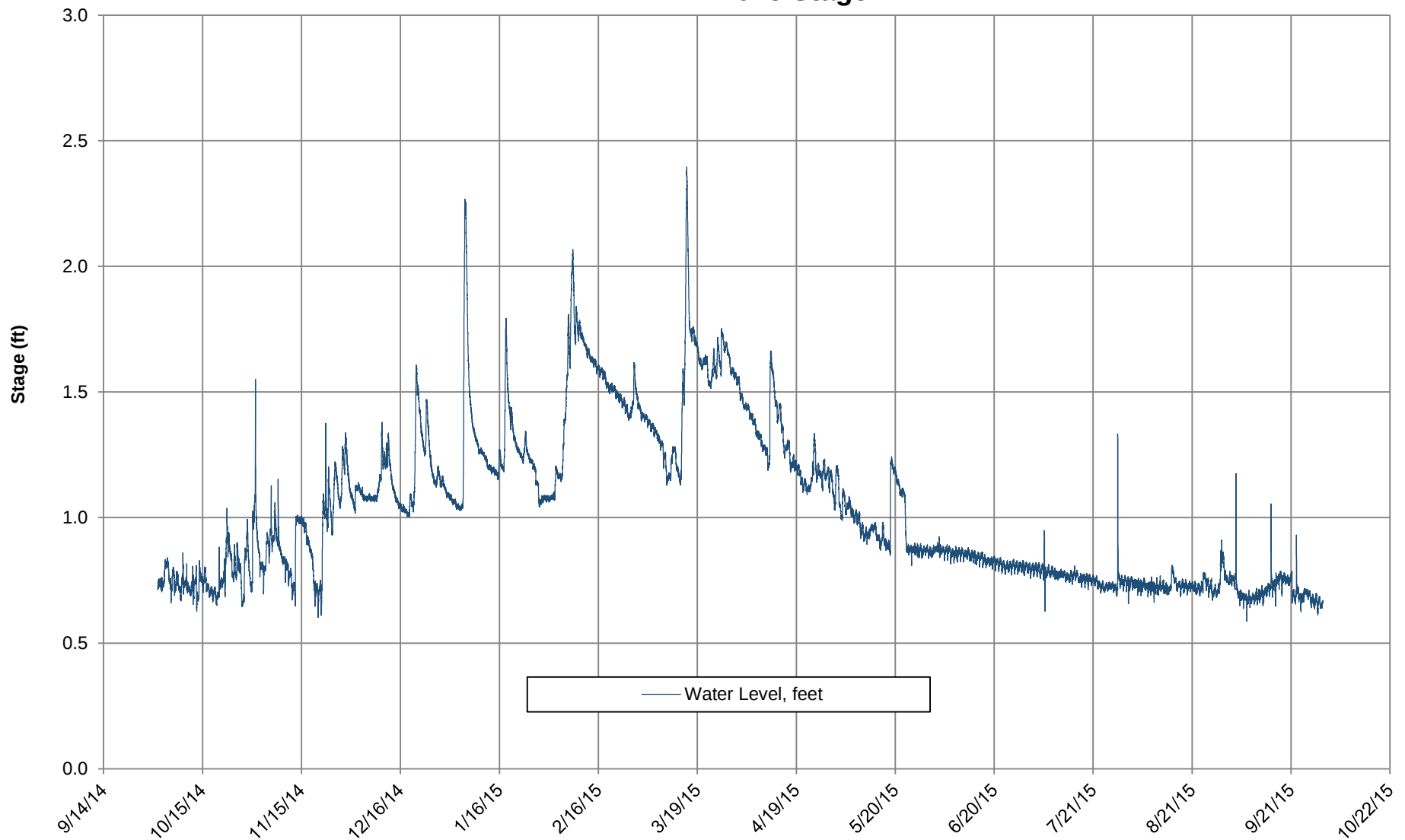


Summary Report and Analysis of Water Year 2015 - 2016
Streamflow

**10a Eaton Creek at Yelm Highway
WY 2016 Stage**

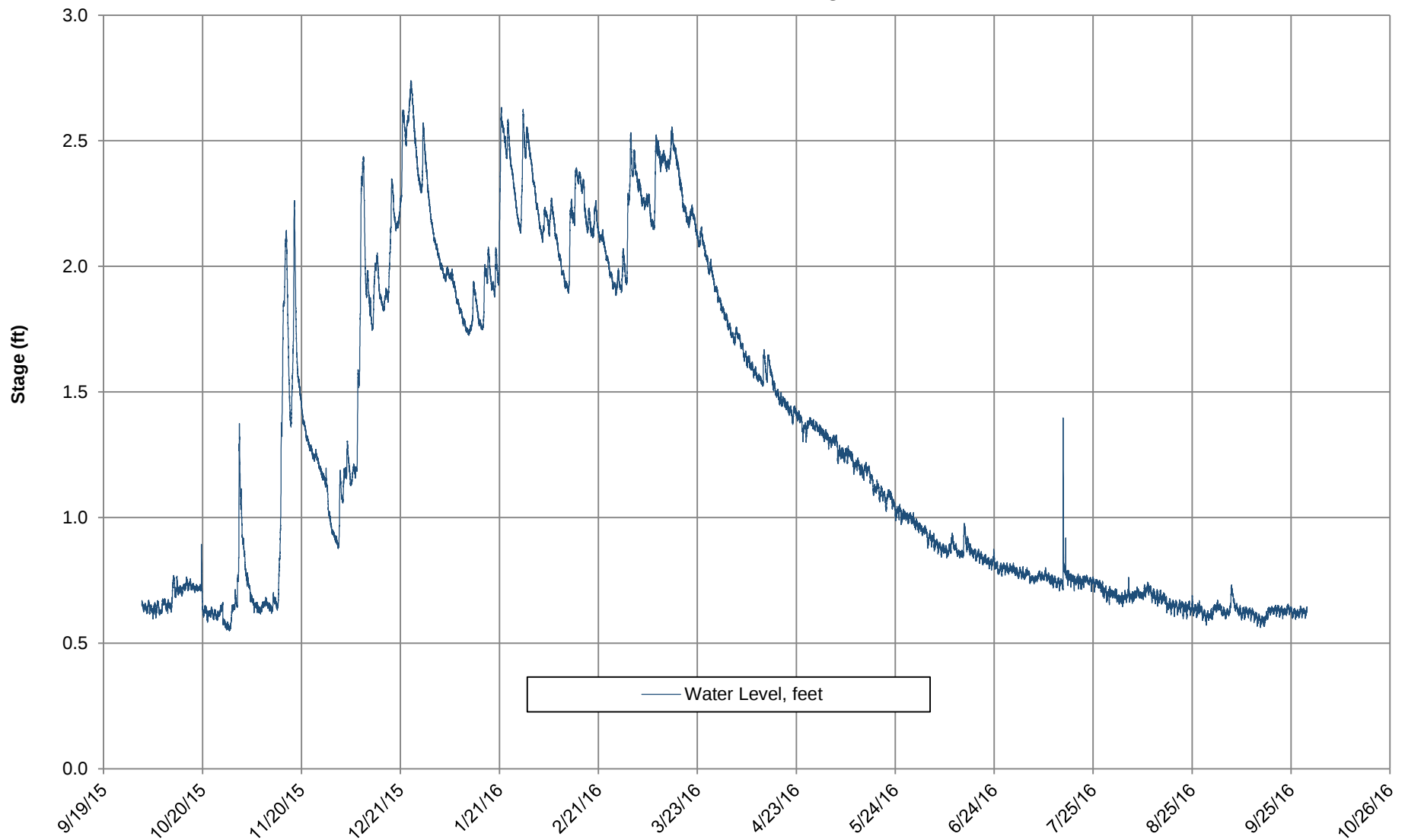


**17a Chambers Creek at Rich Rd
WY 2015 Stage**



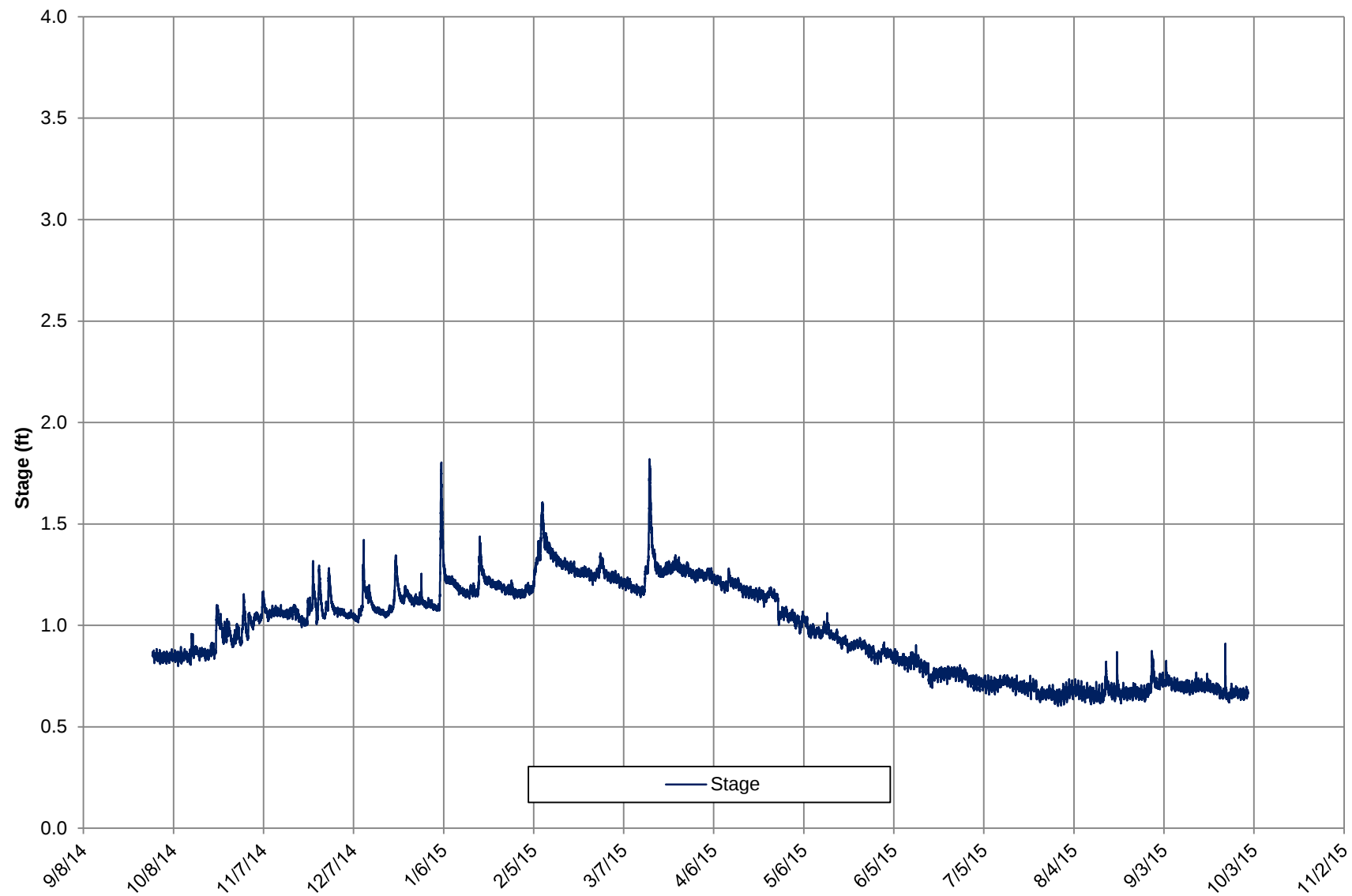
Summary Report and Analysis Water Year 2015 -2016
Streamflow

**17a Chambers Creek at Rich Rd
WY 2016 Stage**



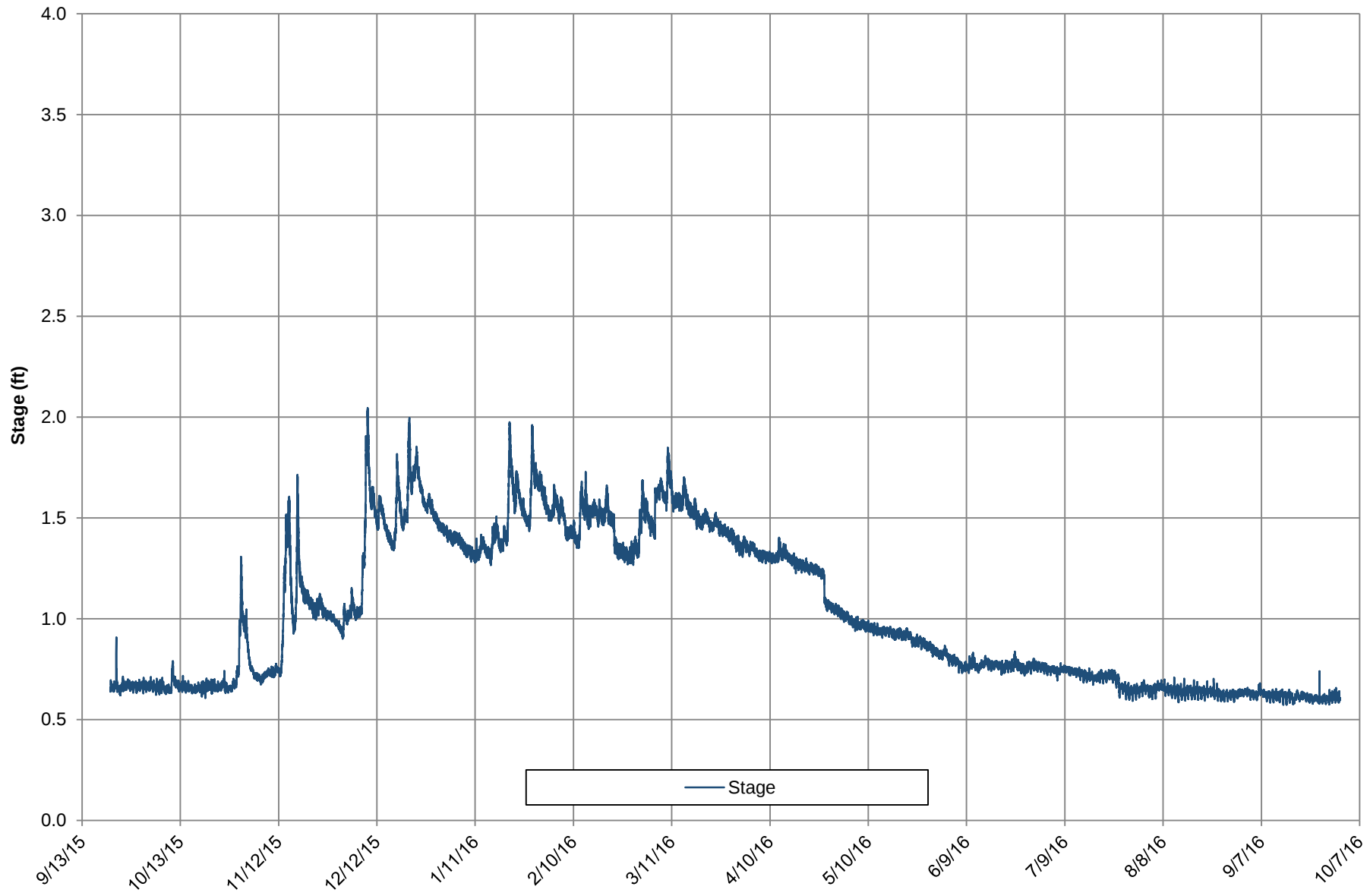
Summary Report and Analysis of Water Year 2015 - 2016
Streamflow

**18a Woodland Creek @ Pleasant Glade Rd
Water Year 2015 Stage**



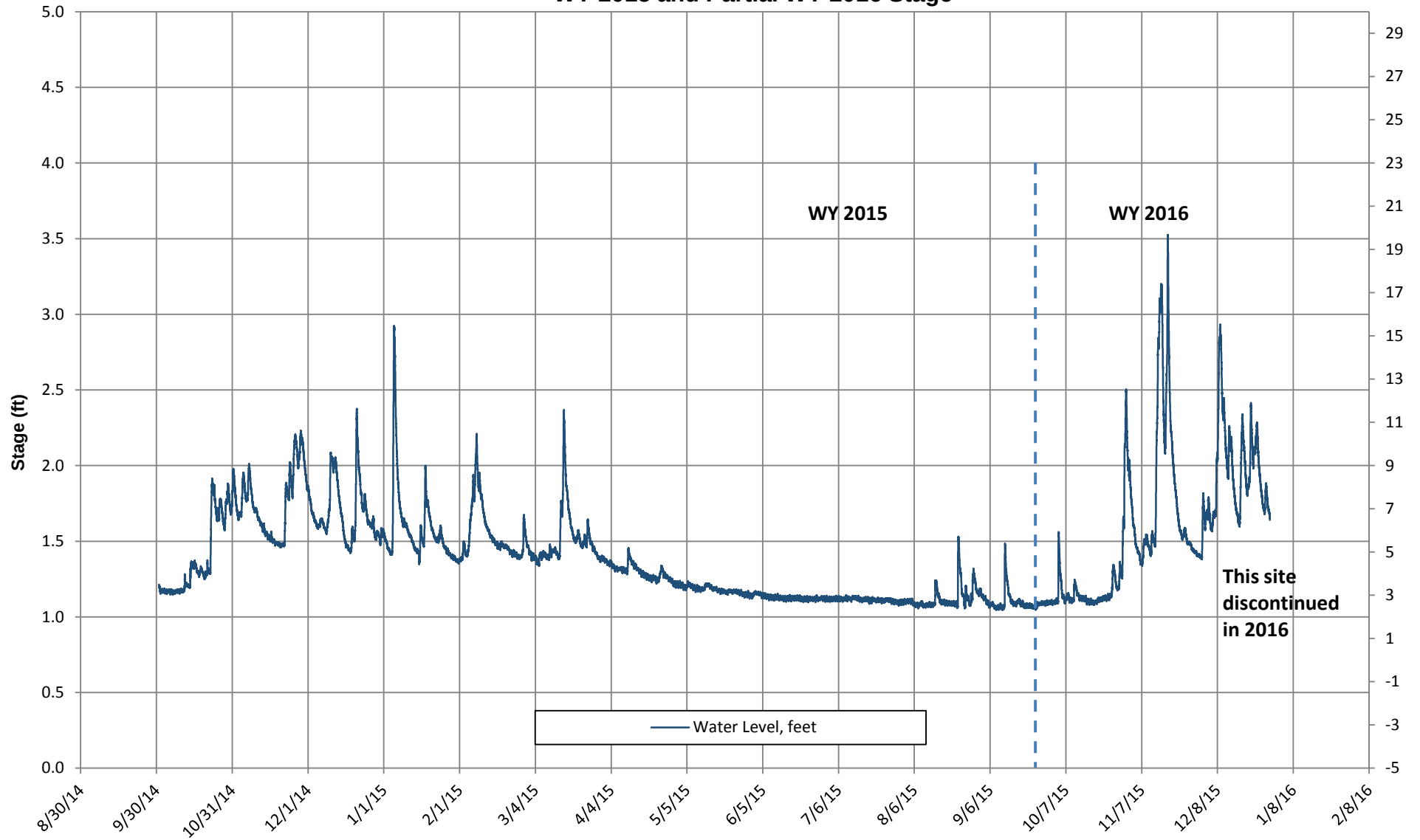
Summary Report and Analysis of Water Years 2015 - 2016
Streamflow

**18a Woodland Creek @ Pleasant Glade Rd
Water Year 2016 Stage**

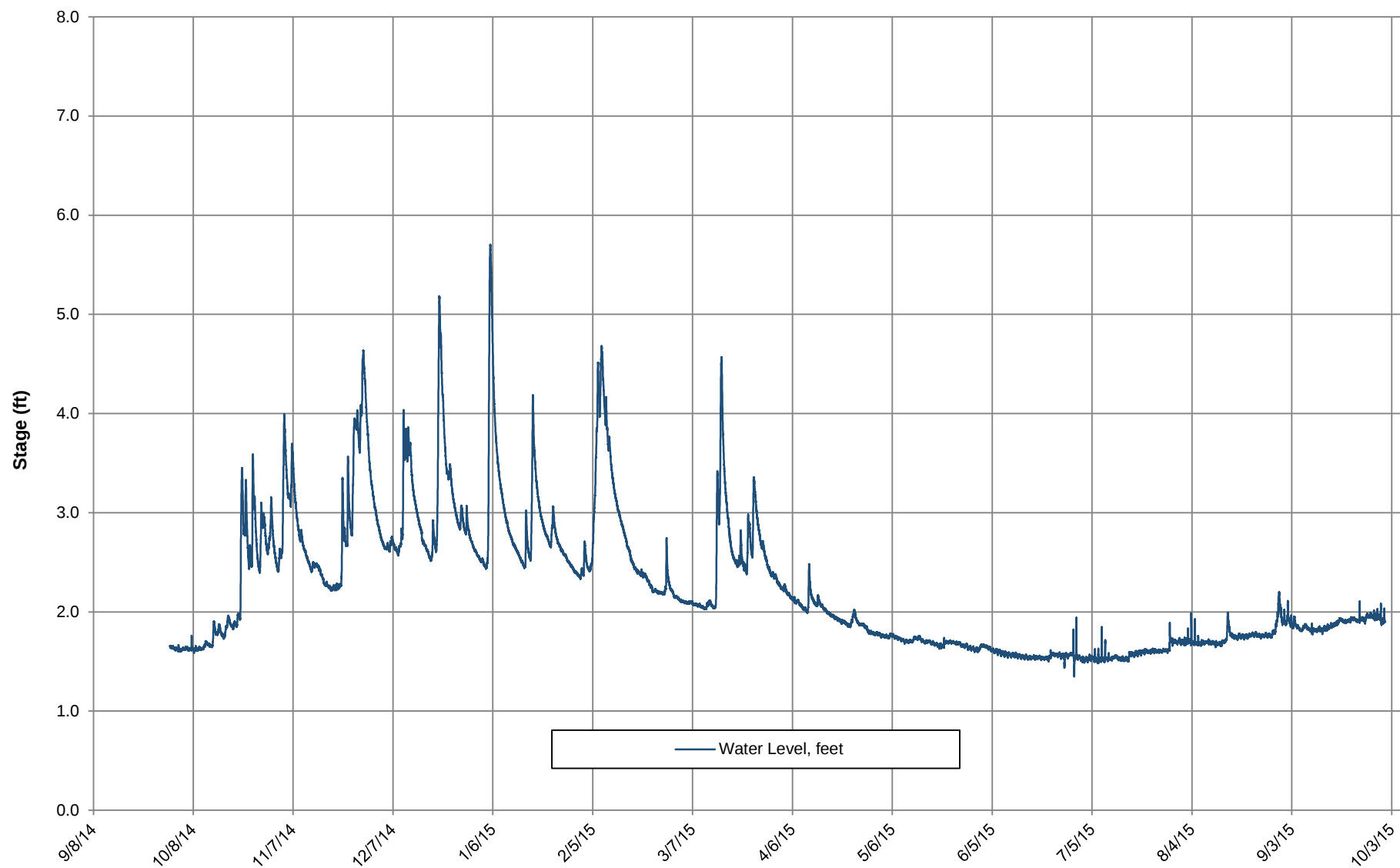


Summary Report and Analysis of Water Year 2015 - 2016
Streamflow

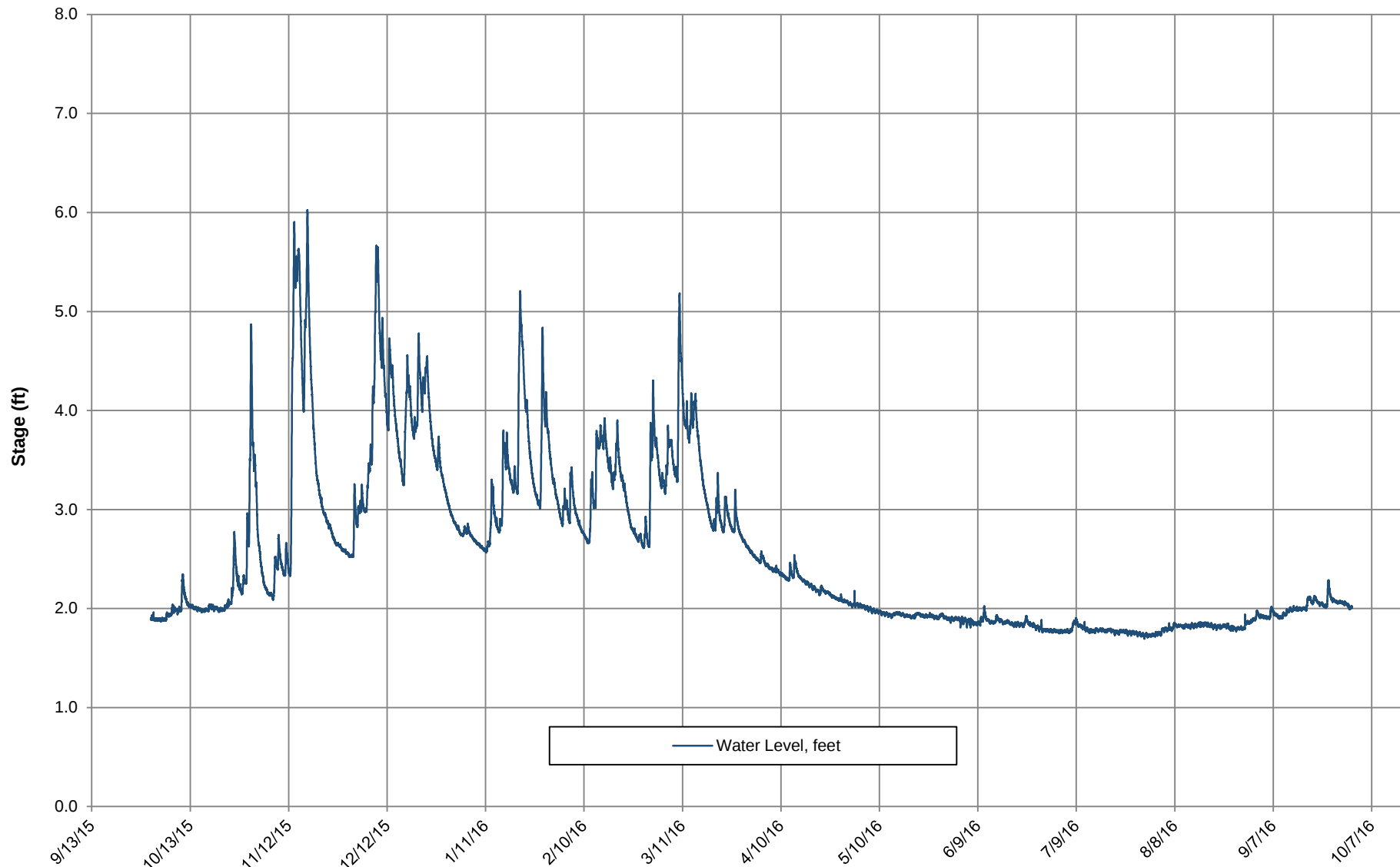
**23b Percival Creek at SPSCC campus
WY 2015 and Partial WY 2016 Stage**



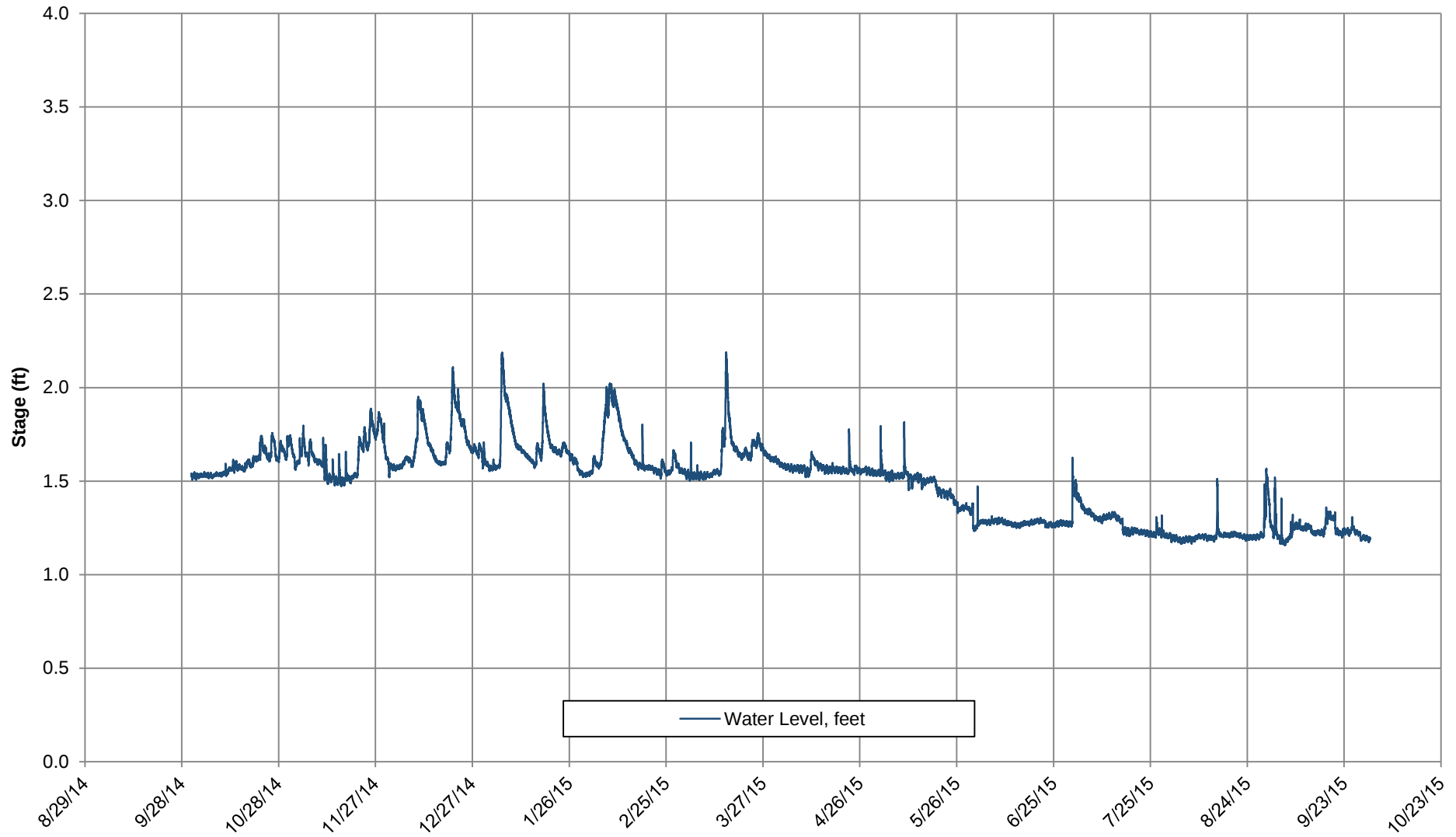
24a McLane Creek at Delphi Rd WY 2015



24a McLane Creek at Delphi Rd WY 2016

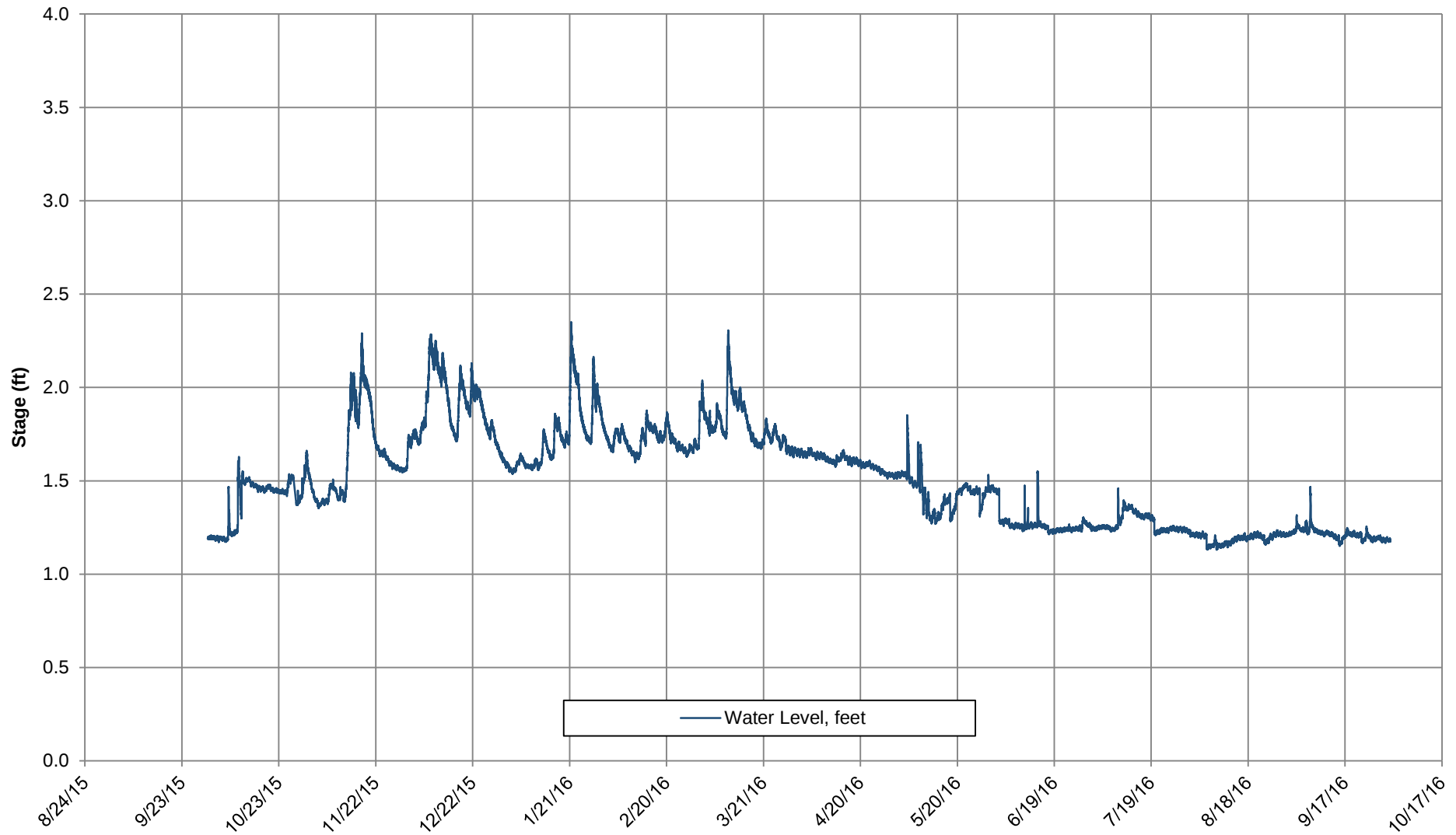


32b Green Cove Creek at 36th Ave. NW
WY 2015 Stage



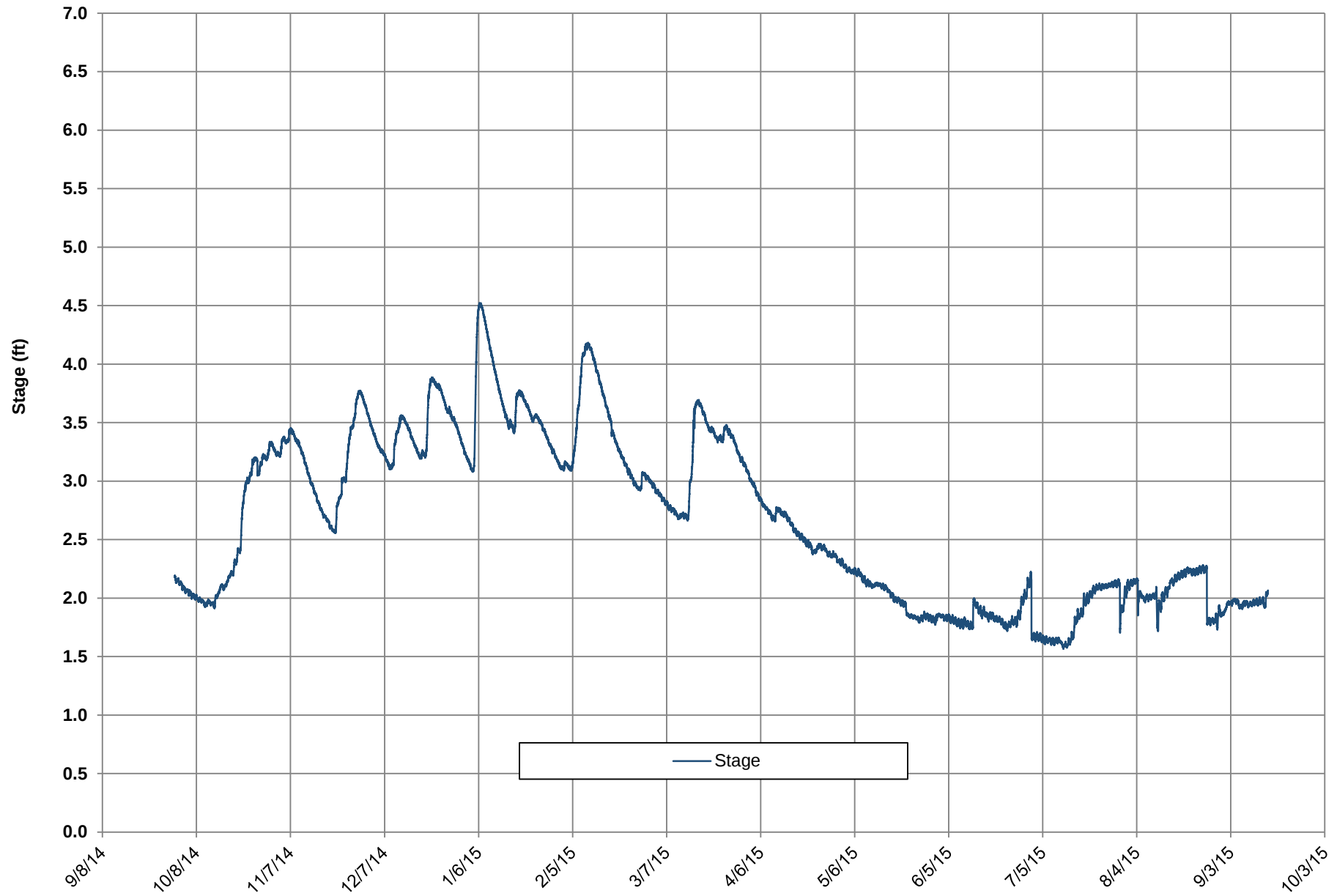
Summary Report and Analysis of Water Year 2015 - 2016
Streamflow

32b Green Cove Creek at 36th Ave. NW
WY 2016 Stage



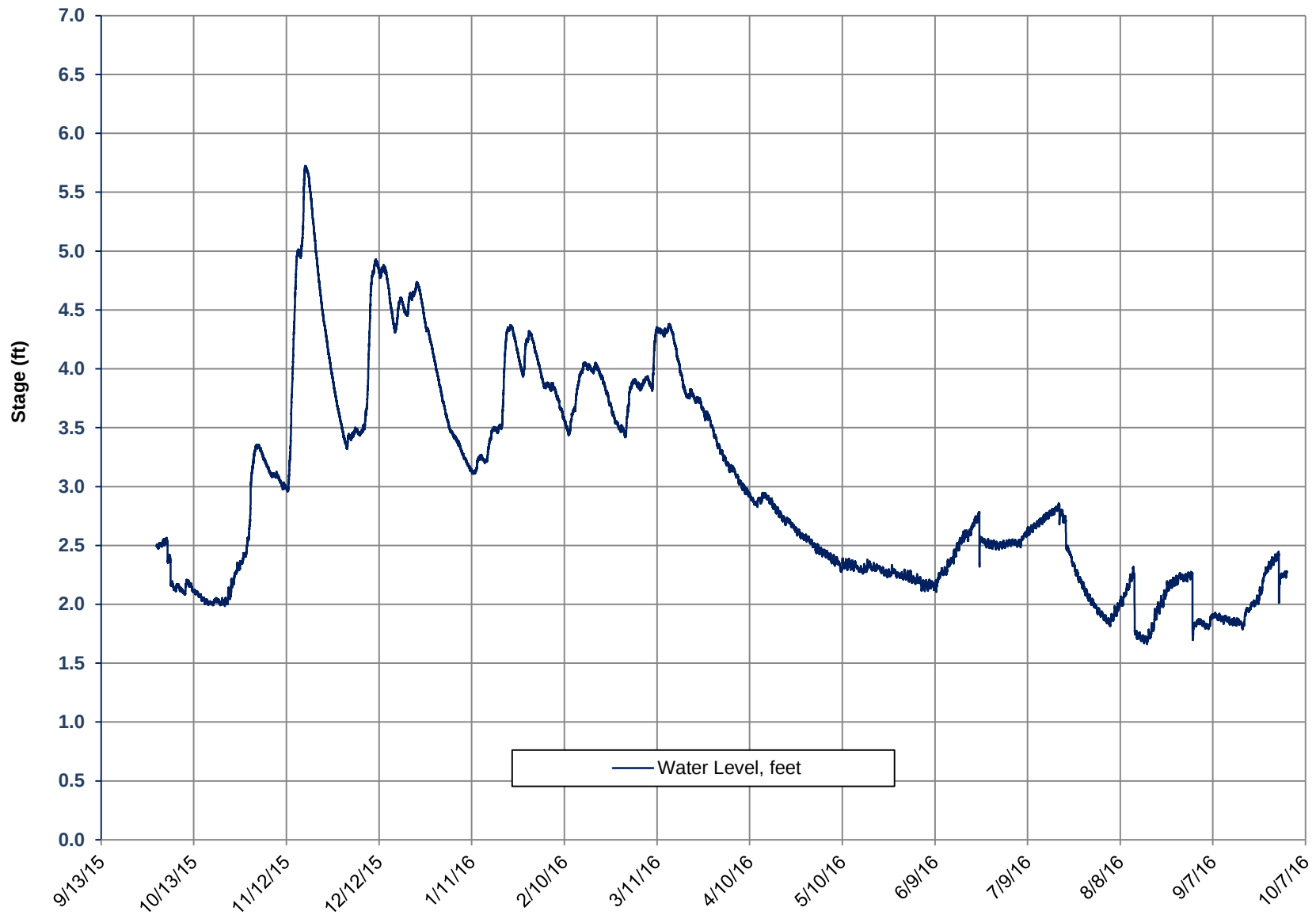
Summary Report and Analysis of Water Year 2015 - 2016

Streamflow
44a Black Lake Ditch @ Belmore Rd
WY 2015 Stage



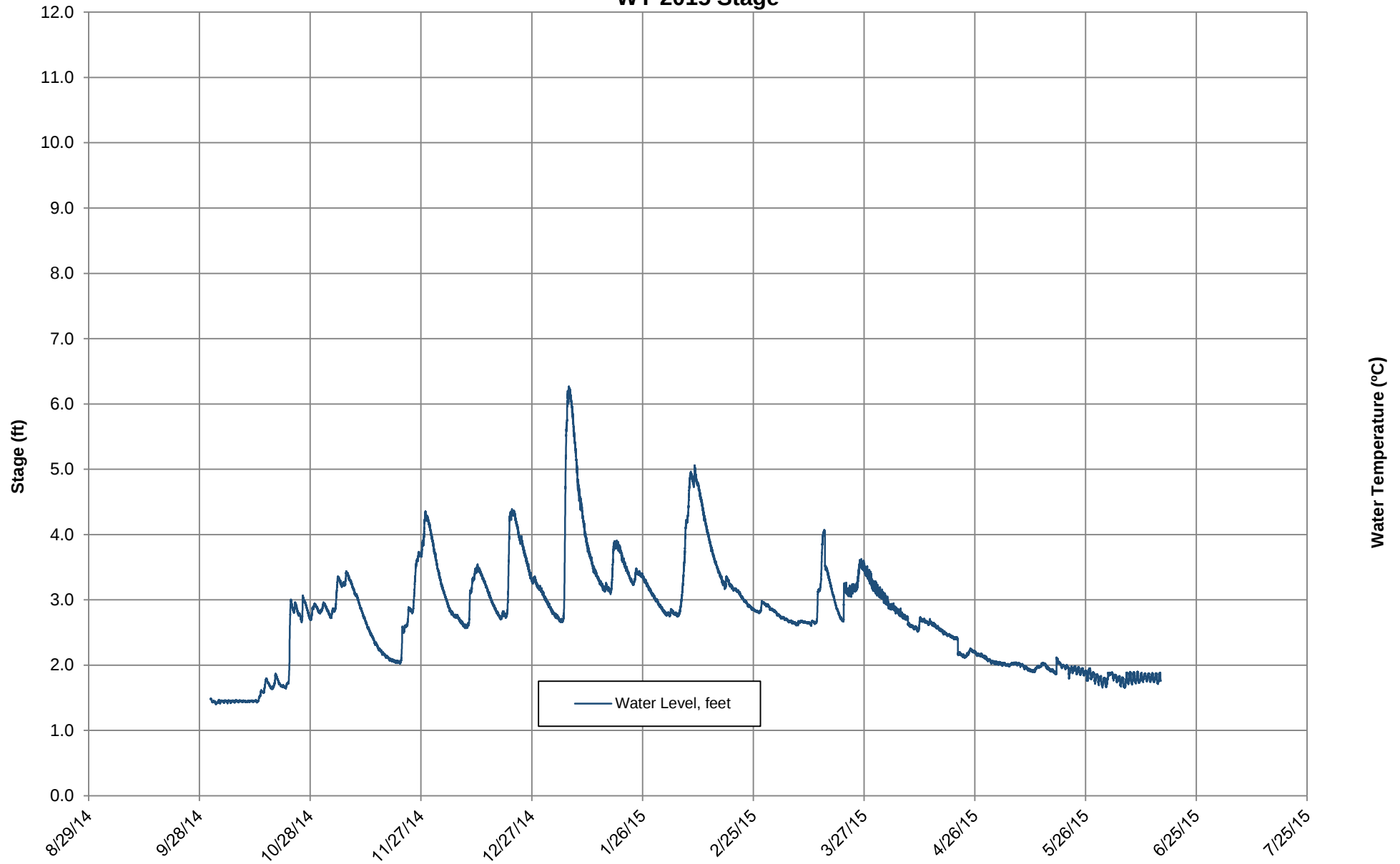
Summary Report and Analysis of Water Years 2015 - 2016
Streamflow

**44a Black Lake Ditch @ Belmore Rd
WY 2016 Stage (ft)**



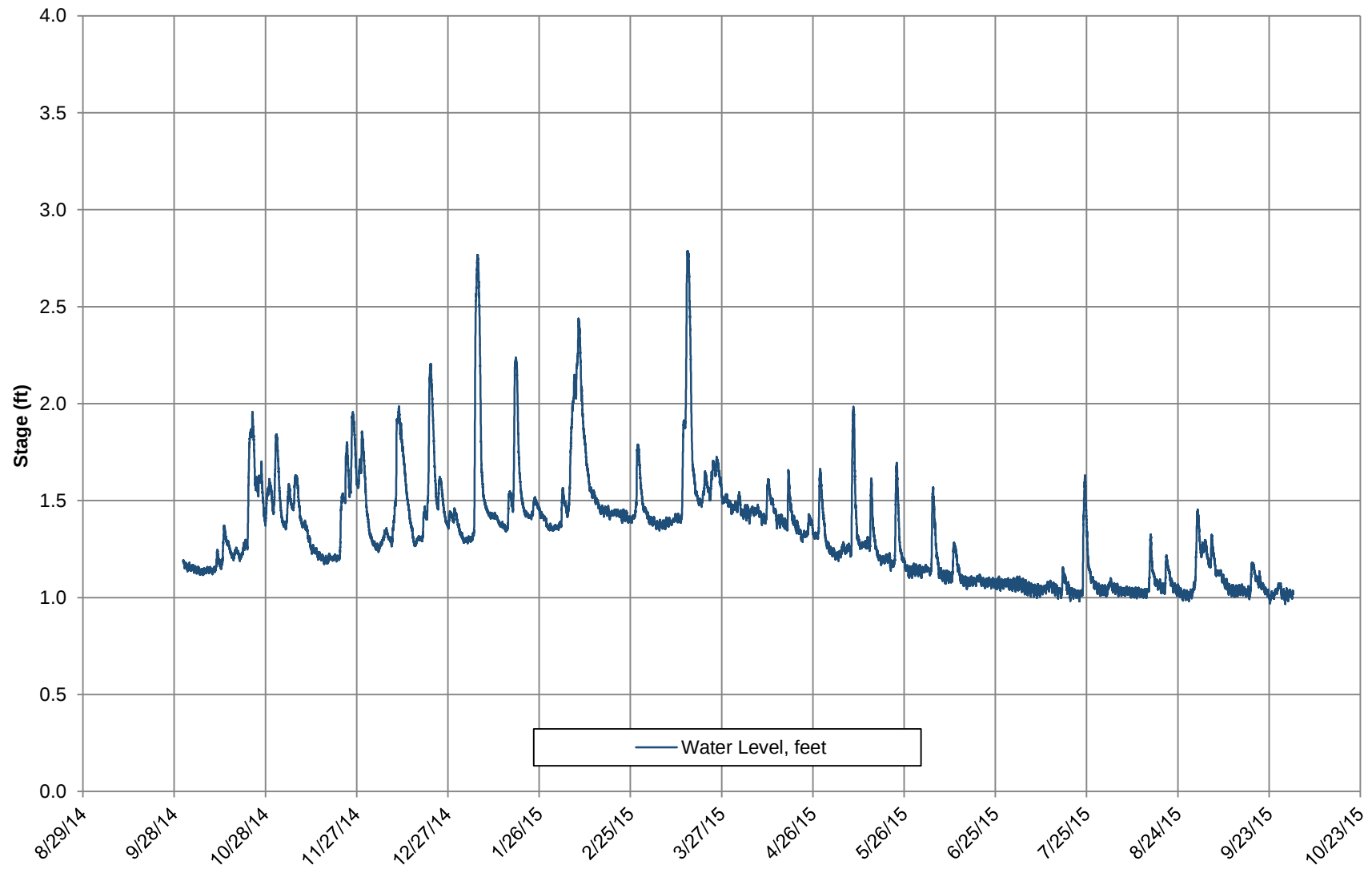
Summary Report and Analysis of Water Year 2015 - 2016
Streamflow

**45b Black River at 128th Ave SW Littlerock
WY 2015 Stage**



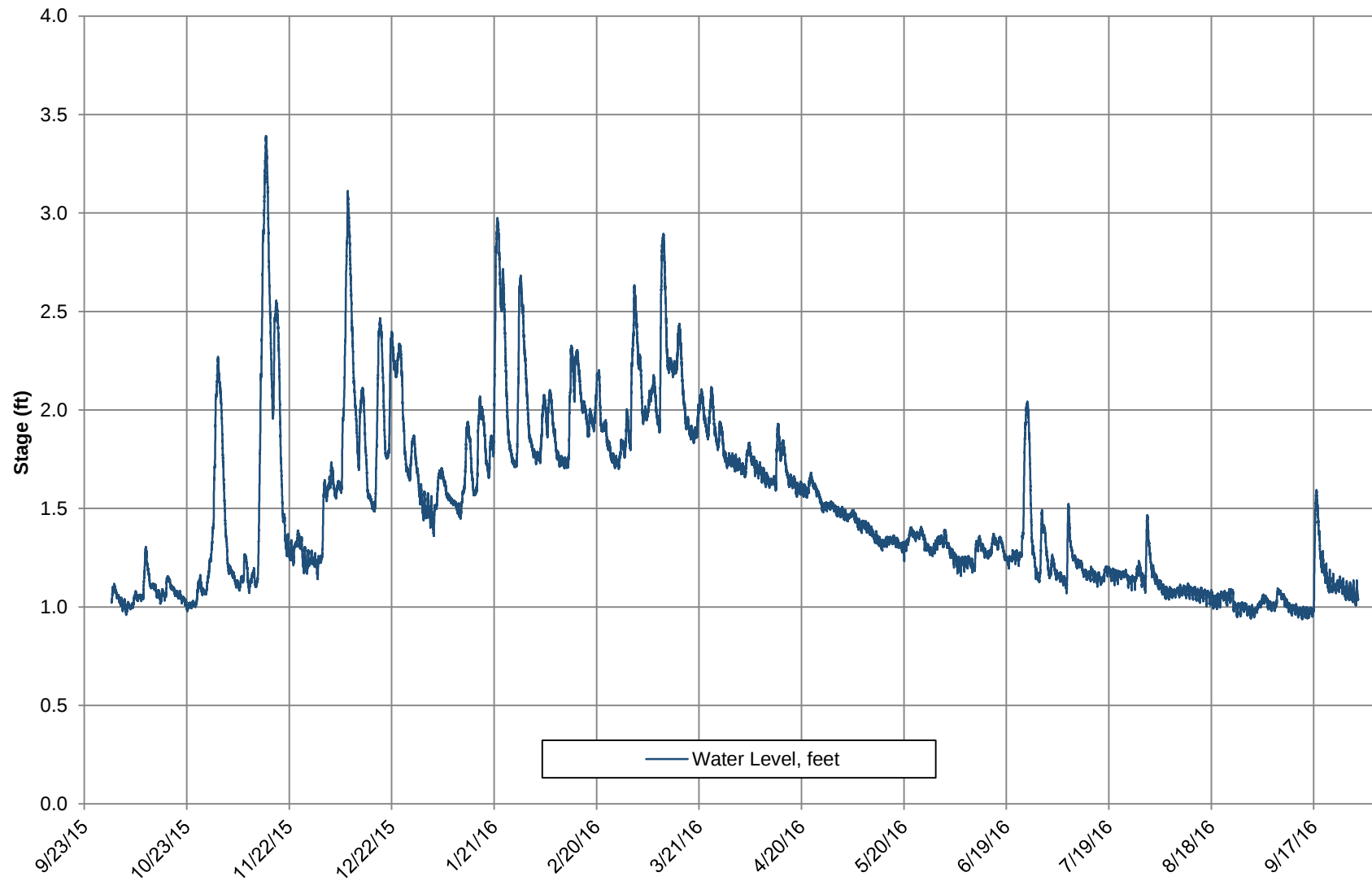
Summary Report and Analysis of Water Years 2015 - 2016
Streamflow

20a Woodard Creek at 36th Ave NE
WY 2015 Stage (ft)



Summary Report and Analysis of Water Years 2015 - 2016
Streamflow

20a Woodard Creek at 36th Ave NE
WY 2016 Stage (ft)



Appendix C

APPENDIX C – Groundwater Data

This Appendix contains daily groundwater elevations for ten automated groundwater wells located in the Salmon Creek Basin for Water Years 2015 and 2016. This basin is located south of the City of Tumwater, Washington. It experiences routine minor groundwater flooding episodes approximately every two to five years with a major groundwater flood event occurring on average every twenty to twenty five years. This section contains.

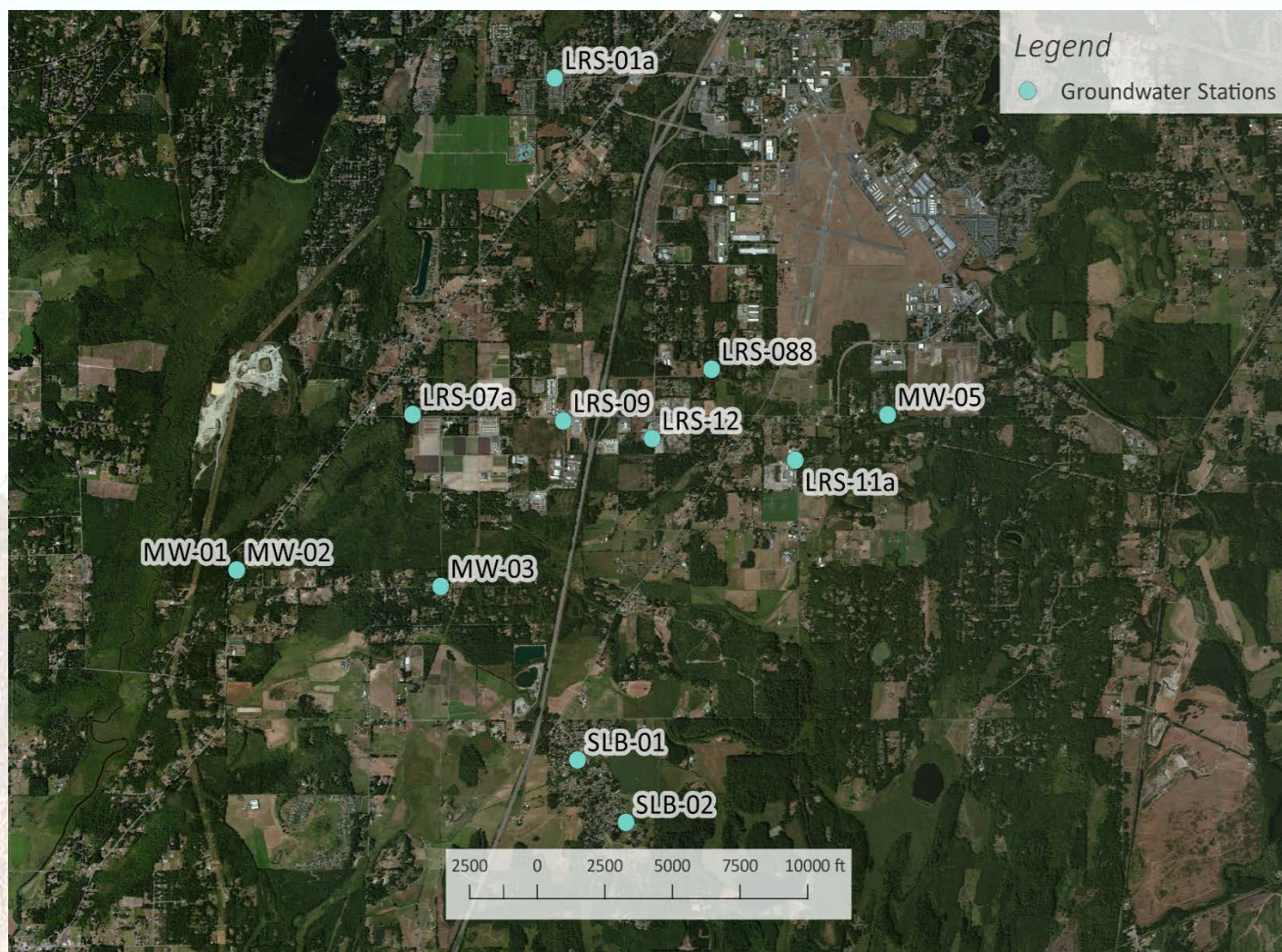
There are other groundwater monitoring locations throughout Thurston County. Many of the locations outside of the Salmon Creek Basin were installed for project-specific subsurface information. As such, they are not included in this report but can be found on Thurston County's website or by email request.

◆ Map of Well Locations in the Salmon Creek Basin

Data Tables for:

- ◆ LRS-07A
- ◆ LRS-08
- ◆ LRS-09
- ◆ LRS-11A
- ◆ LRS-12
- ◆ MW-01
- ◆ MW-02
- ◆ MW-03
- ◆ MW-05
- ◆ LRS-01A Manually Recorded Monthly Data (2009 -2016)
- ◆ Scott Lake SBL-01/SLB-2 Water Year 2015 – 2016 Manual Groundwater Chart

Map of Groundwater Monitoring Wells in Salmon Creek Basin



Groundwater Data Sheets for WY 2015 -2016



LRS7a--3804 93rd Ave SW

Water Year: 2015

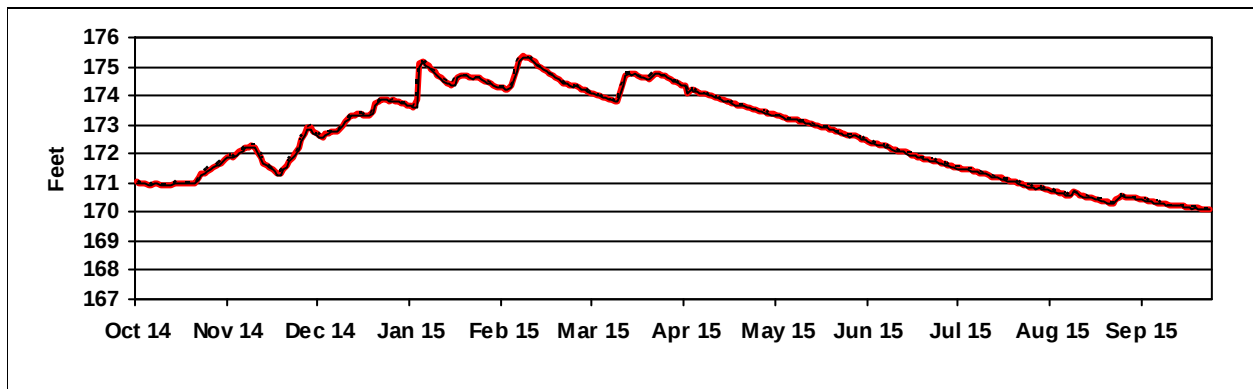
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	171.02	171.90	172.69	173.69	174.27	174.23	174.52	173.45	172.61	171.67	170.84	170.51
02	171.00	171.93	172.60	173.65	174.27	174.19	174.48	173.44	172.60	171.64	170.82	170.52
03	170.99	171.88	172.59	173.61	174.23	174.14	174.44	173.41	172.56	171.61	170.84	170.52
04	170.98	171.99	172.68	173.87	174.23	174.11	174.38	173.36	172.53	171.58	170.82	170.50
05	170.95	172.06	172.73	175.10	174.34	174.06	174.33	173.36	172.49	171.55	170.79	170.47
06	170.93	172.15	172.76	175.16	174.58	174.03	174.05	173.34	172.44	171.53	170.77	170.45
07	170.97	172.24	172.78	175.09	174.95	174.00	174.23	173.31	172.39	171.52	170.73	170.43
08	170.96	172.23	172.79	175.01	175.26	173.96	174.18	173.26	172.37	171.47	170.73	170.41
09	170.95	172.26	172.83	174.90	175.35	173.92	174.13	173.23	172.35	171.48	170.69	170.38
10	170.94	172.24	173.01	174.80	175.34	173.89	174.11	173.21	172.31	171.45	170.67	170.37
11	170.94	172.10	173.13	174.71	175.30	173.86	174.09	173.19	172.30	171.44	170.64	170.34
12	170.92	171.87	173.25	174.60	175.22	173.81	174.06	173.19	172.26	171.42	170.60	170.32
13	170.92	171.70	173.31	174.53	175.15	173.80	174.03	173.17	172.23	171.40	170.58	170.31
14	170.96	171.61	173.35	174.45	175.06	173.99	173.99	173.13	172.17	171.35	170.64	170.29
15	171.00	171.53	173.36	174.42	174.99	174.47	173.96	173.11	172.13	171.34	170.69	170.27
16	171.00	171.46	173.36	174.37	174.91	174.72	173.91	173.09	172.09	171.31	170.65	170.25
17	171.00	171.39	173.32	174.47	174.84	174.77	173.88	173.06	172.08	171.28	170.59	170.25
18	171.01	171.31	173.31	174.66	174.76	174.74	173.84	173.02	172.06	171.21	170.55	170.24
19	170.99	171.34	173.31	174.71	174.70	174.73	173.80	173.01	172.05	171.19	170.53	170.24
20	170.99	171.50	173.49	174.72	174.64	174.69	173.77	172.97	171.99	171.17	170.53	170.21
21	171.00	171.61	173.73	174.68	174.58	174.65	173.75	172.93	171.97	171.16	170.50	170.20
22	171.16	171.75	173.80	174.63	174.51	174.61	173.70	172.91	171.94	171.12	170.46	170.17
23	171.31	171.88	173.85	174.61	174.45	174.60	173.68	172.89	171.91	171.09	170.44	170.14
24	171.36	171.99	173.88	174.64	174.40	174.59	173.68	172.86	171.88	171.06	170.40	170.13
25	171.42	172.25	173.86	174.62	174.34	174.72	173.65	172.83	171.84	171.05	170.39	170.15
26	171.50	172.49	173.83	174.57	174.32	174.75	173.62	172.79	171.82	171.03	170.35	170.13
27	171.54	172.70	173.84	174.52	174.34	174.75	173.59	172.74	171.79	171.01	170.31	170.11
28	171.60	172.88	173.82	174.46	174.28	174.72	173.55	172.71	171.77	170.97	170.31	170.09
29	171.65	172.90	173.79	174.41		174.69	173.53	172.68	171.75	170.94	170.41	170.08
30	171.69	172.75	173.74	174.36		174.64	173.49	172.64	171.72	170.90	170.53	170.07
31	171.84		173.71	174.31		174.58		172.62		170.87	170.54	

Avg Stage	171.14	172.00	173.31	174.53	174.70	174.37	173.95	173.06	172.15	171.28	170.59	170.29
Max Instantaneous	172	173	174	175	175	175	175	173	173	172	171	171
Max Mean Daily	172	173	174	175	175	175	175	173	173	172	171	171

Average Stage for Water Year 2015: 172.61

Thurston County, Water Resources Div, Technical Services Gp. 360-867-2070

Annual Stage (ft)-- Mean — Max ----- Min —



LRS7a--3804 93rd Ave SW

Water Year: 2016

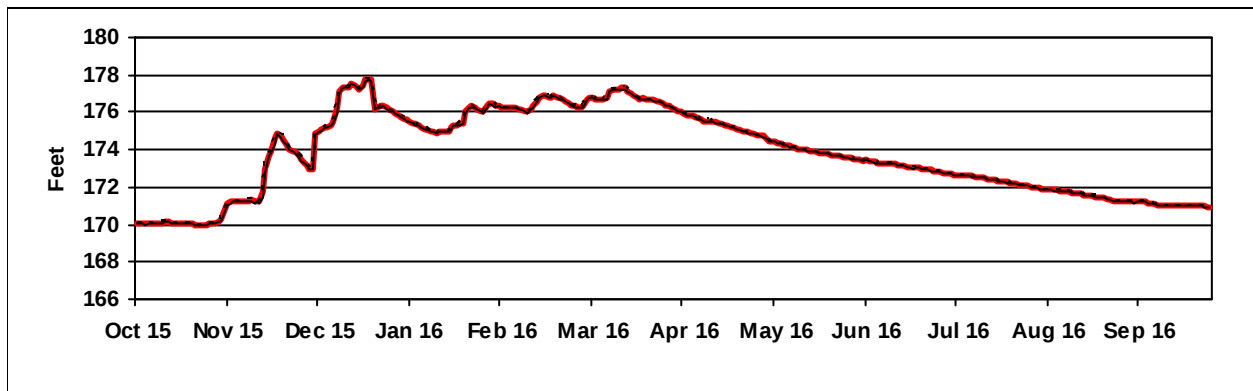
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	170.06	171.10	174.83	175.58	176.39	176.41	176.17	174.71	173.51	172.77	171.98	171.26
02	170.05	171.21	174.95	175.51	176.28	176.72	176.09	174.65	173.49	172.76	171.97	171.26
03	170.03	171.27	175.06	175.41	176.23	176.81	176.02	174.48	173.44	172.72	171.94	171.24
04	170.01	171.27	175.17	175.37	176.26	176.78	175.95	174.45	173.41	172.70	171.90	171.20
05	170.04	171.28	175.24	175.33	176.26	176.74	175.88	174.40	173.46	172.67	171.88	171.20
06	170.04	171.27	175.33	175.22	176.29	176.73	175.88	174.35	173.40	172.65	171.85	171.24
07	170.07	171.29	175.50	175.13	176.24	176.74	175.82	174.32	173.37	172.64	171.84	171.24
08	170.07	171.29	176.28	175.07	176.17	176.69	175.76	174.26	173.33	172.64	171.83	171.21
09	170.05	171.30	177.12	175.00	176.11	176.83	175.68	174.23	173.31	172.64	171.83	171.16
10	170.10	171.19	177.30	174.94	176.03	177.16	175.62	174.18	173.30	172.61	171.82	171.11
11	170.13	171.23	177.30	174.91	176.01	177.20	175.56	174.14	173.28	172.59	171.80	171.09
12	170.13	171.20	177.38	174.99	176.20	177.18	175.54	174.08	173.24	172.56	171.75	171.06
13	170.10	171.79	177.50	175.01	176.33	177.22	175.56	174.05	173.23	172.53	171.73	171.07
14	170.10	173.00	177.44	174.98	176.61	177.30	175.53	174.03	173.23	172.50	171.71	171.05
15	170.07	173.74	177.35	174.97	176.78	177.29	175.46	174.01	173.23	172.48	171.68	171.02
16	170.05	173.88	177.23	175.14	176.88	177.16	175.42	173.97	173.20	172.45	171.65	171.01
17	170.05	174.61	177.44	175.29	176.89	177.03	175.37	173.92	173.15	172.42	171.62	171.05
18	170.04	174.92	177.73	175.34	176.83	176.92	175.32	173.90	173.12	172.39	171.60	171.06
19	170.03	174.78	177.73	175.38	176.81	176.80	175.27	173.87	173.10	172.37	171.56	171.05
20	170.02	174.50	177.73	175.44	176.86	176.74	175.21	173.85	173.06	172.34	171.55	171.05
21	170.00	174.25	176.19	176.07	176.81	176.75	175.15	173.81	173.02	172.31	171.53	171.04
22	170.00	174.05	176.24	176.26	176.76	176.70	175.13	173.79	173.02	172.29	171.50	171.02
23	169.98	173.92	176.35	176.32	176.70	176.66	175.07	173.76	173.01	172.26	171.48	171.04
24	169.97	173.87	176.40	176.24	176.59	176.69	175.02	173.73	172.99	172.23	171.45	171.04
25	169.97	173.65	176.24	176.14	176.49	176.65	174.98	173.70	172.98	172.21	171.42	171.03
26	170.06	173.45	176.11	176.03	176.40	176.63	174.93	173.67	172.93	172.18	171.35	171.01
27	170.06	173.28	176.07	176.00	176.32	176.57	174.89	173.65	172.90	172.14	171.33	170.99
28	170.08	173.14	175.98	176.33	176.29	176.49	174.84	173.63	172.87	172.11	171.29	170.97
29	170.12	173.00	175.88	176.44	176.29	176.41	174.79	173.61	172.84	172.07	171.27	170.96
30	170.28	172.98	175.77	176.43		176.33	174.74	173.59	172.82	172.04	171.27	170.95
31	170.81		175.67	176.32		176.24		173.54		172.01	171.24	

Avg Stage	170.08	172.72	176.40	175.57	176.45	176.79	175.42	174.01	173.17	172.43	171.63	171.09
Max Instantaneous	171	175	178	176	177	177	176	175	174	173	172	171
Max Mean Daily	171	175	178	176	177	177	176	175	174	173	172	171

Average Stage for Water Year 2016: 173.81

Thurston County, Water Resources Div, Technical Services Gp. 360-867-2072

Annual Stage (ft)-- Mean — Max ----- Min —



10/06/2016 3:07:11 PM

LRS8--8943 Walter Ct SW

Water Year: 2015

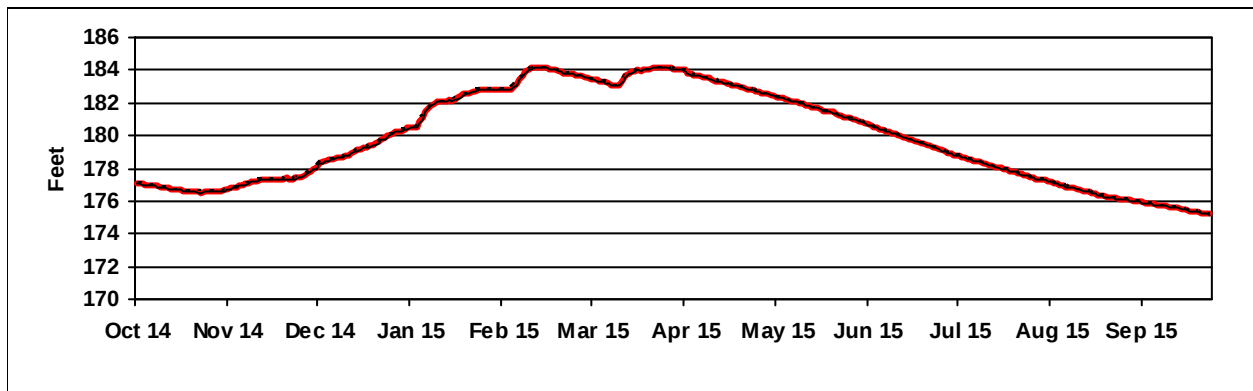
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	177.09	176.72	178.11	180.45	182.85	183.63	184.07	182.64	181.00	179.10	177.42	176.11
02	177.06	176.78	178.30	180.48	182.86	183.61	184.05	182.60	180.95	179.03	177.36	176.07
03	177.03	176.83	178.38	180.50	182.79	183.55	184.04	182.56	180.89	178.96	177.38	176.05
04	177.02	176.87	178.44	180.56	182.83	183.48	184.02	182.49	180.82	178.91	177.33	176.02
05	176.99	176.94	178.50	180.90	182.88	183.43	184.00	182.45	180.77	178.83	177.28	175.98
06	176.95	176.98	178.53	181.14	183.00	183.38	183.82	182.39	180.69	178.79	177.23	175.97
07	176.95	177.05	178.59	181.49	183.13	183.34	183.75	182.34	180.62	178.75	177.17	175.93
08	176.91	177.12	178.64	181.74	183.49	183.30	183.68	182.28	180.55	178.69	177.13	175.89
09	176.88	177.18	178.68	181.90	183.71	183.26	183.66	182.22	180.50	178.64	177.07	175.87
10	176.84	177.22	178.72	182.00	183.89	183.23	183.63	182.18	180.42	178.59	177.02	175.85
11	176.81	177.26	178.79	182.05	184.04	183.11	183.56	182.14	180.36	178.54	176.96	175.82
12	176.78	177.30	178.84	182.07	184.13	183.05	183.56	182.10	180.30	178.48	176.90	175.78
13	176.77	177.32	178.92	182.13	184.18	183.06	183.51	182.05	180.24	178.44	176.85	175.76
14	176.74	177.32	179.02	182.15	184.16	183.09	183.40	181.99	180.18	178.39	176.83	175.73
15	176.70	177.32	179.11	182.19	184.20	183.40	183.37	181.93	180.10	178.33	176.79	175.70
16	176.68	177.35	179.18	182.14	184.18	183.68	183.36	181.88	180.04	178.27	176.74	175.66
17	176.65	177.37	179.25	182.25	184.16	183.81	183.30	181.82	179.99	178.22	176.69	175.62
18	176.62	177.37	179.30	182.30	184.09	183.90	183.26	181.76	179.93	178.15	176.63	175.58
19	176.60	177.37	179.35	182.40	184.05	183.96	183.24	181.71	179.87	178.09	176.58	175.56
20	176.57	177.38	179.43	182.54	184.01	183.99	183.18	181.68	179.81	178.05	176.56	175.52
21	176.56	177.39	179.48	182.61	183.94	183.98	183.09	181.60	179.75	178.01	176.50	175.50
22	176.54	177.36	179.60	182.64	183.91	184.02	183.05	181.54	179.68	177.96	176.45	175.46
23	176.53	177.37	179.75	182.69	183.85	184.03	183.04	181.50	179.62	177.91	176.39	175.42
24	176.56	177.39	179.86	182.76	183.80	184.04	182.97	181.48	179.56	177.85	176.36	175.38
25	176.56	177.43	179.96	182.84	183.75	184.13	182.93	181.42	179.49	177.81	176.30	175.37
26	176.55	177.51	180.06	182.85	183.77	184.19	182.87	181.36	179.43	177.78	176.25	175.33
27	176.57	177.61	180.15	182.83	183.72	184.20	182.85	181.29	179.37	177.72	176.21	175.29
28	176.59	177.72	180.24	182.84	183.63	184.19	182.78	181.23	179.32	177.64	176.20	175.26
29	176.60	177.81	180.26	182.86		184.19	182.72	181.17	179.25	177.59	176.17	175.23
30	176.64	177.92	180.32	182.87		184.21	182.69	181.10	179.20	177.55	176.14	175.20
31	176.67		180.40	182.87		184.11		181.06		177.47	176.11	

Avg Stage	176.74	177.29	179.23	182.07	183.68	183.70	183.38	181.87	180.09	178.28	176.74	175.66
Max Instantaneous	177	178	180	183	184	184	184	183	181	179	177	176
Max Mean Daily	177	178	180	183	184	184	184	183	181	179	177	176

Average Stage for Water Year 2015: 179.89

Thurston County, Water Resources Div, Technical Services Gp. 360-867-2070

Annual Stage (ft)-- Mean — Max ----- Min —



11/24/2015 3:53:07 PM

LRS8--8943 Walter Ct SW

Water Year: 2016

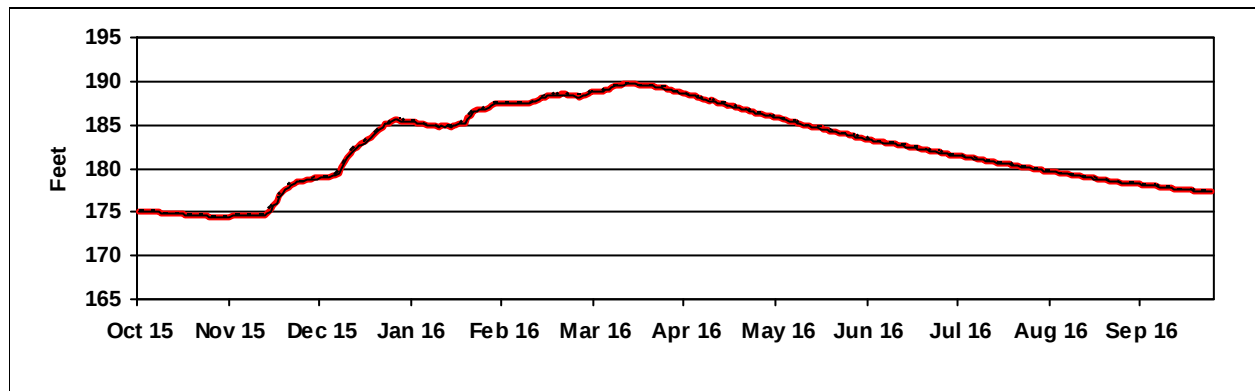
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	175.17	174.48	178.86	185.36	187.41	188.36	188.80	186.16	183.66	181.73	179.92	178.32
02	175.15	174.53	178.90	185.33	187.40	188.63	188.72	186.04	183.58	181.67	179.86	178.28
03	175.10	174.56	178.94	185.27	187.41	188.77	188.65	186.01	183.50	181.60	179.81	178.24
04	175.08	174.57	178.97	185.26	187.46	188.87	188.52	185.93	183.43	181.55	179.77	178.21
05	175.07	174.57	179.07	185.20	187.52	188.91	188.44	185.84	183.33	181.49	179.70	178.17
06	175.04	174.57	179.13	185.14	187.54	188.91	188.40	185.75	183.27	181.43	179.65	178.12
07	175.02	174.57	179.22	185.01	187.54	188.91	188.30	185.65	183.20	181.40	179.61	178.13
08	174.98	174.57	179.49	184.98	187.55	188.96	188.18	185.55	183.10	181.33	179.57	178.07
09	174.94	174.56	180.18	184.88	187.53	189.10	188.06	185.44	183.05	181.27	179.51	178.04
10	174.91	174.55	180.85	184.84	187.40	189.27	187.94	185.36	182.99	181.20	179.46	178.00
11	174.88	174.54	181.34	184.80	187.42	189.41	187.83	185.29	182.93	181.15	179.41	177.96
12	174.85	174.55	181.78	184.89	187.58	189.47	187.78	185.18	182.89	181.08	179.36	177.91
13	174.83	174.60	182.11	184.82	187.71	189.55	187.80	185.11	182.84	181.01	179.30	177.87
14	174.81	174.86	182.38	184.84	187.90	189.63	187.70	185.02	182.79	180.95	179.24	177.81
15	174.78	175.32	182.63	184.79	188.07	189.73	187.55	184.95	182.74	180.90	179.18	177.77
16	174.74	175.78	182.78	184.91	188.24	189.72	187.50	184.84	182.66	180.86	179.12	177.74
17	174.72	176.20	183.00	185.03	188.38	189.71	187.41	184.78	182.61	180.81	179.07	177.69
18	174.69	176.80	183.27	185.08	188.34	189.64	187.32	184.72	182.53	180.73	179.02	177.65
19	174.65	177.28	183.57	185.17	188.34	189.55	187.22	184.66	182.49	180.68	178.95	177.61
20	174.64	177.64	183.79	185.22	188.44	189.53	187.12	184.60	182.40	180.63	178.92	177.59
21	174.59	177.92	184.18	185.75	188.44	189.51	187.04	184.49	182.35	180.56	178.86	177.56
22	174.57	178.14	184.44	186.17	188.49	189.40	186.92	184.44	182.30	180.51	178.79	177.51
23	174.54	178.31	184.80	186.48	188.51	189.42	186.83	184.35	182.23	180.46	178.74	177.49
24	174.52	178.42	185.09	186.65	188.40	189.40	186.76	184.26	182.16	180.41	178.69	177.45
25	174.49	178.52	185.23	186.71	188.36	189.37	186.67	184.17	182.12	180.33	178.64	177.45
26	174.46	178.59	185.41	186.75	188.32	189.36	186.61	184.12	182.05	180.27	178.58	177.42
27	174.43	178.69	185.50	186.85	188.25	189.25	186.50	184.04	181.98	180.21	178.53	177.39
28	174.40	178.76	185.52	187.08	188.24	189.17	186.40	183.98	181.92	180.15	178.48	177.36
29	174.38	178.82	185.49	187.25	188.29	189.11	186.29	183.90	181.84	180.10	178.44	177.32
30	174.35	178.86	185.40	187.35		189.00	186.21	183.82	181.79	180.04	178.39	177.29
31	174.39		185.36	187.39		188.90		183.76		179.99	178.36	

Avg Stage	174.75	176.27	182.47	185.65	187.95	189.24	187.52	184.91	182.69	180.85	179.13	177.78
Max Instantaneous	175	179	186	187	189	190	189	186	184	182	180	178
Max Mean Daily	175	179	186	187	189	190	189	186	184	182	180	178

Average Stage for Water Year 2016: 182.43

Thurston County, Water Resources Div, Technical Services Gp. 360-867-2072

Annual Stage (ft)-- Mean — Max ----- Min —



10/06/2016 1:30:40 PM

LRS9--2729 93rd Ave SW (Lathrop)

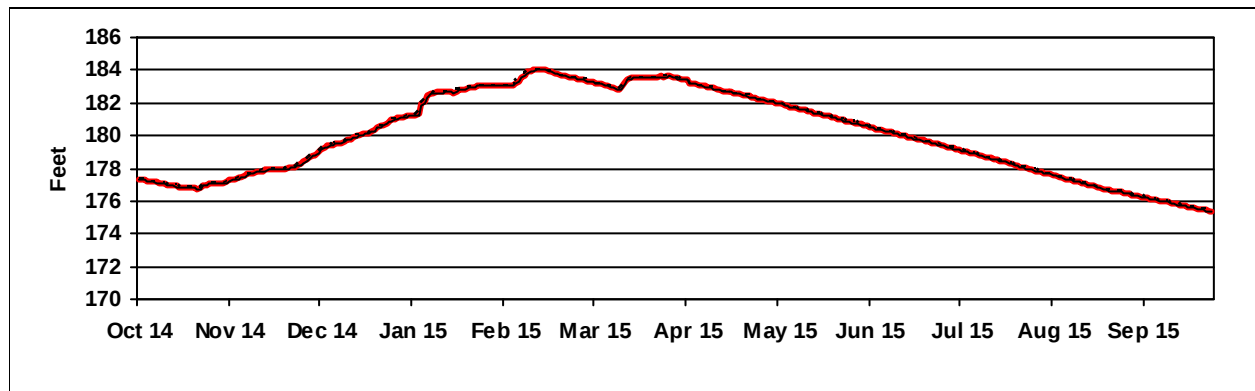
Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	177.35	177.27	179.01	181.22	183.09	183.38	183.53	182.18	180.80	179.37	177.87	176.46
02	177.31	177.28	179.17	181.24	183.07	183.37	183.50	182.14	180.75	179.31	177.81	176.43
03	177.28	177.33	179.27	181.25	183.02	183.32	183.48	182.10	180.69	179.27	177.79	176.40
04	177.25	177.39	179.35	181.35	183.02	183.26	183.44	182.05	180.64	179.23	177.74	176.36
05	177.20	177.48	179.41	181.94	183.09	183.22	183.40	182.00	180.59	179.18	177.70	176.32
06	177.16	177.53	179.45	182.09	183.22	183.17	183.25	181.95	180.54	179.13	177.65	176.29
07	177.15	177.64	179.51	182.40	183.35	183.13	183.20	181.92	180.49	179.09	177.59	176.24
08	177.11	177.69	179.53	182.55	183.57	183.08	183.14	181.86	180.44	179.05	177.55	176.20
09	177.07	177.75	179.56	182.62	183.74	183.03	183.09	181.81	180.40	179.01	177.49	176.16
10	177.03	177.81	179.67	182.65	183.88	183.00	183.06	181.78	180.35	178.96	177.43	176.12
11	177.00	177.85	179.75	182.65	183.97	182.93	183.01	181.74	180.31	178.92	177.38	176.07
12	176.97	177.86	179.82	182.65	184.00	182.86	183.00	181.70	180.27	178.87	177.33	176.04
13	176.93	177.89	179.88	182.66	184.03	182.84	182.95	181.66	180.22	178.81	177.28	176.01
14	176.91	177.90	179.96	182.66	184.02	182.90	182.89	181.60	180.17	178.76	177.26	175.97
15	176.89	177.91	180.01	182.66	184.03	183.29	182.85	181.56	180.12	178.72	177.21	175.93
16	176.87	177.92	180.08	182.64	184.01	183.44	182.82	181.51	180.07	178.66	177.16	175.89
17	176.86	177.93	180.13	182.71	183.98	183.50	182.75	181.46	180.04	178.62	177.11	175.85
18	176.83	177.94	180.19	182.84	183.91	183.55	182.73	181.41	179.99	178.55	177.05	175.81
19	176.79	177.95	180.24	182.84	183.86	183.58	182.69	181.37	179.94	178.51	177.00	175.78
20	176.78	177.98	180.35	182.88	183.81	183.58	182.66	181.34	179.89	178.48	176.97	175.74
21	176.76	178.01	180.51	182.91	183.73	183.56	182.61	181.27	179.84	178.43	176.92	175.70
22	176.81	178.04	180.57	182.95	183.68	183.56	182.56	181.24	179.80	178.38	176.87	175.66
23	176.97	178.10	180.66	182.98	183.62	183.53	182.54	181.19	179.74	178.32	176.81	175.62
24	177.02	178.15	180.75	183.06	183.58	183.53	182.49	181.15	179.71	178.27	176.75	175.58
25	177.03	178.25	180.86	183.11	183.54	183.59	182.45	181.10	179.65	178.22	176.71	175.55
26	177.07	178.39	180.94	183.11	183.51	183.61	182.40	181.05	179.60	178.19	176.66	175.52
27	177.09	178.50	181.01	183.11	183.48	183.62	182.37	180.99	179.57	178.12	176.62	175.47
28	177.09	178.64	181.07	183.11	183.41	183.60	182.32	180.95	179.53	178.07	176.58	175.44
29	177.12	178.76	181.10	183.12		183.63	182.27	180.91	179.47	178.01	176.55	175.40
30	177.13	178.85	181.14	183.12		183.63	182.23	180.85	179.42	177.97	176.55	175.38
31	177.19		181.18	183.11		183.58		180.81		177.91	176.53	
Avg Stage	177.03	177.93	180.13	182.59	183.62	183.35	182.86	181.50	180.10	178.66	177.16	175.91
Max Instantaneous	177	179	181	183	184	184	184	182	181	179	178	176
Max Mean Daily	177	179	181	183	184	184	184	182	181	179	178	176

Average Stage for Water Year 2015: 180.07

Thurston County, Water Resources Div, Technical Services Gp. 360-867-2070

Annual Stage (ft)-- Mean — Max ----- Min —



11/24/2015 4:03:56 PM

LRS9--2729 93rd Ave SW (Lathrop)

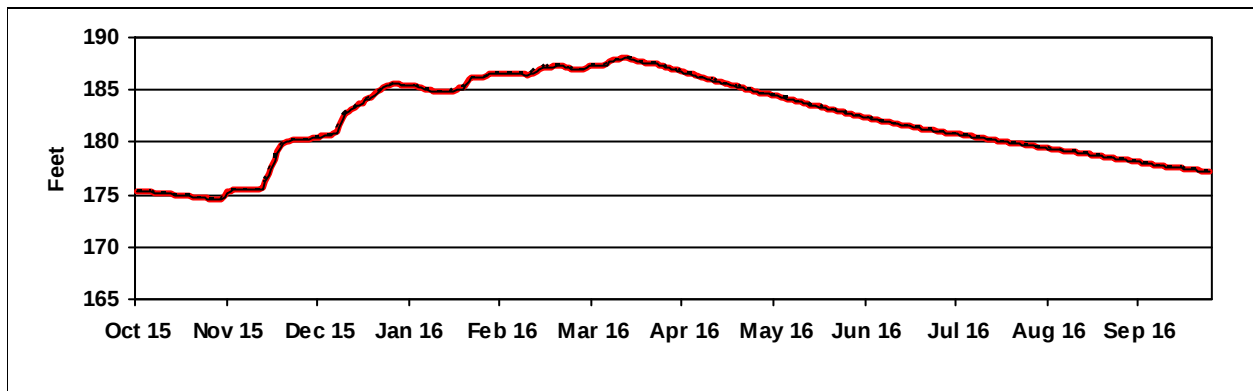
Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	175.35	175.24	180.44	185.48	186.63	186.91	186.95	184.70	182.63	180.97	179.63	178.31
02	175.31	175.39	180.49	185.44	186.58	187.18	186.86	184.63	182.56	180.93	179.59	178.27
03	175.26	175.47	180.57	185.39	186.54	187.31	186.78	184.61	182.50	180.87	179.54	178.22
04	175.23	175.48	180.60	185.35	186.55	187.34	186.67	184.54	182.44	180.83	179.50	178.18
05	175.24	175.48	180.66	185.28	186.62	187.35	186.59	184.47	182.36	180.83	179.45	178.14
06	175.22	175.48	180.71	185.19	186.62	187.31	186.54	184.40	182.30	180.79	179.41	178.11
07	175.18	175.47	180.79	185.10	186.63	187.33	186.47	184.33	182.25	180.75	179.37	178.02
08	175.15	175.48	181.08	185.04	186.62	187.37	186.39	184.24	182.18	180.70	179.33	177.98
09	175.11	175.48	181.66	184.96	186.58	187.46	186.29	184.17	182.12	180.65	179.28	177.94
10	175.08	175.47	182.34	184.90	186.48	187.69	186.19	184.09	182.06	180.60	179.24	177.90
11	175.07	175.48	182.75	184.86	186.42	187.82	186.11	184.04	182.00	180.56	179.21	177.86
12	175.05	175.49	182.97	184.89	186.53	187.84	186.03	183.96	181.96	180.51	179.17	177.81
13	175.02	175.68	183.19	184.84	186.65	187.92	185.99	183.89	181.91	180.46	179.13	177.78
14	175.00	176.34	183.35	184.81	186.84	188.02	185.92	183.81	181.85	180.42	179.08	177.73
15	174.96	176.99	183.50	184.78	187.00	188.13	185.83	183.74	181.81	180.38	179.03	177.68
16	174.94	177.66	183.61	184.84	187.13	188.07	185.77	183.66	181.74	180.33	179.00	177.65
17	174.90	178.44	183.78	184.94	187.23	187.99	185.71	183.60	181.69	180.29	178.95	177.61
18	174.88	179.17	184.03	185.05	187.21	187.87	185.64	183.54	181.63	180.24	178.91	177.58
19	174.84	179.69	184.19	185.14	187.19	187.75	185.57	183.48	181.58	180.20	178.87	177.54
20	174.81	179.94	184.36	185.15	187.26	187.66	185.51	183.42	181.52	180.15	178.84	177.52
21	174.77	180.08	184.59	185.51	187.27	187.63	185.44	183.34	181.47	180.11	178.80	177.48
22	174.76	180.16	184.79	185.92	187.26	187.54	185.35	183.27	181.44	180.07	178.74	177.44
23	174.71	180.21	185.03	186.12	187.27	187.50	185.26	183.20	181.38	180.01	178.70	177.41
24	174.68	180.26	185.25	186.20	187.16	187.48	185.19	183.13	181.31	179.98	178.65	177.36
25	174.65	180.27	185.37	186.22	187.08	187.46	185.11	183.06	181.28	179.94	178.61	177.34
26	174.62	180.28	185.46	186.21	187.02	187.44	185.05	183.00	181.22	179.89	178.57	177.31
27	174.60	180.32	185.53	186.23	186.94	187.35	184.97	182.94	181.18	179.84	178.53	177.27
28	174.58	180.35	185.56	186.38	186.89	187.27	184.90	182.88	181.13	179.80	178.48	177.23
29	174.55	180.35	185.56	186.50	186.90	187.21	184.81	182.81	181.07	179.76	178.44	177.20
30	174.56	180.39	185.51	186.59		187.11	184.74	182.75	181.02	179.71	178.40	177.16
31	174.85		185.49	186.62		187.03		182.69		179.67	178.36	
Avg Stage	174.93	177.73	183.33	185.48	186.87	187.53	185.82	183.69	181.79	180.33	178.99	177.70
Max Instantaneous	175	180	186	187	187	188	187	185	183	181	180	178
Max Mean Daily	175	180	186	187	187	188	187	185	183	181	180	178

Average Stage for Water Year 2016: 182.02

Thurston County, Water Resources Div, Technical Services Gp. 360-867-2072

Annual Stage (ft)-- Mean — Max ----- Min —



LRS11a--9605 Tilley Rd S

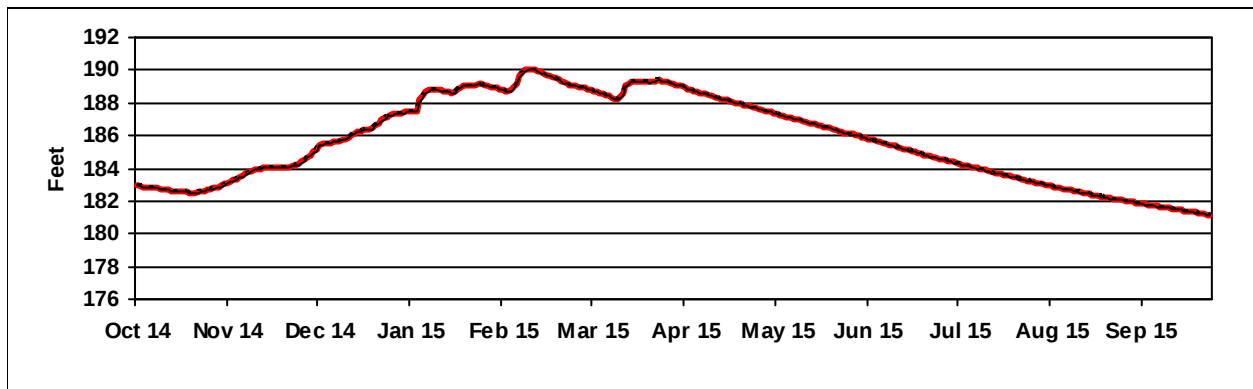
Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	182.95	183.13	185.21	187.45	188.86	188.90	189.17	187.59	186.08	184.56	183.17	182.03
02	182.93	183.20	185.41	187.44	188.83	188.93	189.12	187.54	186.03	184.51	183.12	181.99
03	182.90	183.28	185.48	187.42	188.72	188.84	189.07	187.49	185.98	184.47	183.09	181.97
04	182.88	183.38	185.51	187.50	188.71	188.78	189.03	187.44	185.92	184.42	183.05	181.94
05	182.84	183.46	185.56	188.20	188.77	188.71	188.99	187.38	185.87	184.37	183.01	181.90
06	182.81	183.55	185.58	188.43	188.94	188.65	188.85	187.33	185.81	184.32	182.97	181.88
07	182.81	183.66	185.60	188.66	189.25	188.59	188.79	187.29	185.77	184.27	182.92	181.84
08	182.78	183.76	185.62	188.78	189.68	188.53	188.72	187.23	185.71	184.23	182.89	181.81
09	182.76	183.84	185.65	188.84	189.89	188.47	188.65	187.17	185.67	184.18	182.84	181.78
10	182.72	183.91	185.73	188.85	190.00	188.42	188.61	187.13	185.62	184.14	182.80	181.74
11	182.70	183.97	185.81	188.82	190.05	188.35	188.57	187.09	185.57	184.10	182.76	181.71
12	182.67	184.00	185.91	188.77	190.04	188.27	188.52	187.04	185.52	184.05	182.71	181.68
13	182.65	184.04	186.03	188.74	190.00	188.23	188.48	187.00	185.46	184.01	182.68	181.67
14	182.63	184.06	186.16	188.70	189.93	188.29	188.42	186.94	185.41	183.95	182.67	181.64
15	182.61	184.07	186.24	188.69	189.87	188.64	188.36	186.90	185.36	183.91	182.63	181.60
16	182.59	184.08	186.31	188.64	189.81	189.05	188.32	186.85	185.30	183.88	182.59	181.57
17	182.57	184.10	186.35	188.68	189.74	189.24	188.27	186.80	185.25	183.82	182.54	181.55
18	182.55	184.09	186.38	188.83	189.65	189.31	188.22	186.75	185.21	183.77	182.50	181.52
19	182.52	184.10	186.41	188.96	189.58	189.34	188.18	186.70	185.16	183.72	182.46	181.49
20	182.50	184.09	186.49	189.06	189.50	189.35	188.14	186.66	185.10	183.70	182.45	181.46
21	182.49	184.10	186.64	189.10	189.42	189.31	188.08	186.60	185.06	183.66	182.41	181.43
22	182.55	184.11	186.78	189.11	189.34	189.28	188.02	186.55	185.01	183.61	182.36	181.40
23	182.61	184.14	186.94	189.10	189.26	189.27	187.98	186.50	184.94	183.56	182.32	181.36
24	182.64	184.17	187.08	189.12	189.19	189.26	187.93	186.45	184.91	183.52	182.29	181.33
25	182.68	184.25	187.17	189.15	189.11	189.32	187.88	186.40	184.84	183.48	182.25	181.32
26	182.74	184.37	187.23	189.13	189.07	189.37	187.83	186.34	184.79	183.44	182.21	181.29
27	182.78	184.53	187.31	189.08	189.04	189.40	187.79	186.29	184.75	183.39	182.17	181.25
28	182.84	184.70	187.36	189.03	188.96	189.37	187.74	186.23	184.71	183.34	182.14	181.23
29	182.87	184.85	187.38	189.00		189.35	187.69	186.19	184.65	183.30	182.14	181.19
30	182.92	184.98	187.40	188.95		189.31	187.64	186.13	184.60	183.26	182.13	181.17
31	183.03		187.42	188.90		189.24		186.08		183.21	182.10	
Avg Stage	182.73	184.00	186.33	188.68	189.40	188.95	188.37	186.84	185.34	183.88	182.59	181.59
Max Instantaneous	183	185	187	189	190	189	189	188	186	185	183	182
Max Mean Daily	183	185	187	189	190	189	189	188	186	185	183	182

Average Stage for Water Year 2015: 185.72

Thurston County, Water Resources Div, Technical Services Gp. 360-867-2070

Annual Stage (ft)-- Mean — Max ----- Min —



11/30/2015 8:43:26 AM

LRS11a--9605 Tilley Rd S

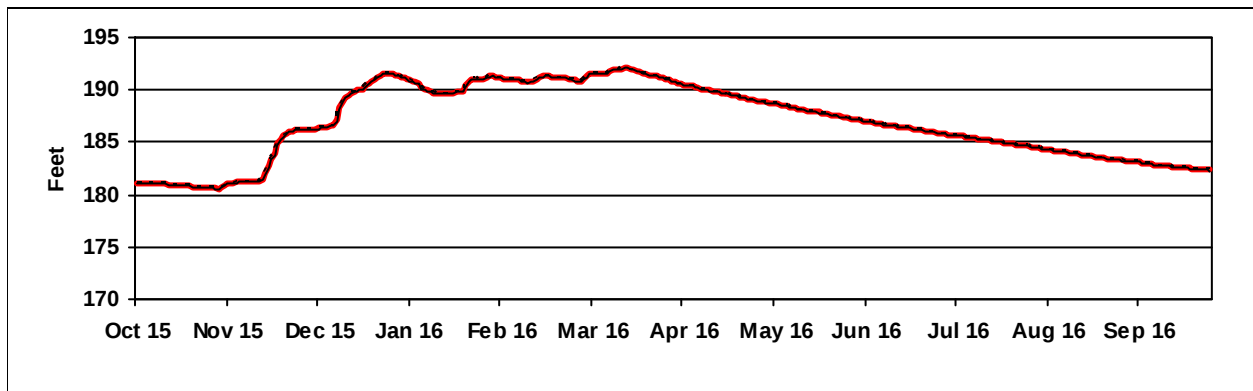
Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	181.15	181.02	186.31	191.01	191.18	191.02	190.77	188.87	187.23	185.83	184.51	183.23
02	181.14	181.09	186.32	190.91	191.10	191.35	190.69	188.80	187.17	185.78	184.47	183.20
03	181.10	181.14	186.36	190.81	191.03	191.51	190.60	188.79	187.11	185.73	184.42	183.17
04	181.06	181.17	186.38	190.72	191.01	191.55	190.51	188.74	187.07	185.69	184.37	183.14
05	181.08	181.20	186.46	190.65	191.01	191.55	190.43	188.68	187.02	185.70	184.33	183.11
06	181.06	181.22	186.54	190.16	190.99	191.51	190.42	188.62	186.97	185.66	184.29	183.09
07	181.08	181.23	186.66	190.04	190.96	191.50	190.36	188.57	186.92	185.62	184.25	183.00
08	181.06	181.25	187.19	189.95	190.92	191.51	190.28	188.50	186.87	185.58	184.21	182.96
09	181.03	181.25	188.34	189.85	190.86	191.58	190.20	188.43	186.81	185.53	184.17	182.94
10	181.02	181.26	188.94	189.75	190.77	191.77	190.11	188.36	186.76	185.50	184.13	182.91
11	180.99	181.27	189.27	189.69	190.71	191.90	190.03	188.32	186.69	185.45	184.09	182.87
12	180.97	181.29	189.52	189.68	190.78	191.90	189.97	188.25	186.66	185.41	184.04	182.83
13	180.94	181.46	189.74	189.65	190.86	191.94	189.95	188.19	186.61	185.36	184.00	182.81
14	180.92	182.03	189.89	189.61	191.04	192.00	189.90	188.13	186.58	185.31	183.96	182.77
15	180.89	182.86	189.97	189.57	191.20	192.12	189.82	188.08	186.55	185.27	183.92	182.74
16	180.87	183.41	189.99	189.62	191.29	192.09	189.77	188.02	186.50	185.23	183.88	182.71
17	180.85	184.02	190.10	189.73	191.35	192.00	189.72	187.97	186.46	185.20	183.83	182.69
18	180.83	184.82	190.40	189.82	191.30	191.89	189.67	187.94	186.42	185.15	183.79	182.66
19	180.80	185.29	190.64	189.88	191.25	191.77	189.61	187.89	186.38	185.11	183.75	182.63
20	180.78	185.58	190.74	189.89	191.25	191.68	189.54	187.85	186.34	185.06	183.71	182.61
21	180.74	185.82	190.98	190.34	191.24	191.61	189.49	187.79	186.29	185.02	183.68	182.57
22	180.72	186.00	191.23	190.81	191.20	191.50	189.42	187.73	186.25	184.97	183.63	182.53
23	180.70	186.12	191.43	191.01	191.18	191.44	189.33	187.68	186.21	184.93	183.57	182.51
24	180.68	186.20	191.65	191.08	191.11	191.40	189.28	187.63	186.15	184.89	183.53	182.48
25	180.65	186.23	191.63	191.05	191.03	191.35	189.21	187.57	186.11	184.85	183.48	182.45
26	180.65	186.26	191.56	190.97	190.97	191.31	189.15	187.51	186.06	184.79	183.44	182.43
27	180.62	186.29	191.52	190.93	190.90	191.23	189.10	187.47	186.01	184.74	183.41	182.40
28	180.60	186.31	191.45	191.13	190.85	191.14	189.03	187.42	185.96	184.70	183.37	182.37
29	180.59	186.31	191.36	191.29	190.83	191.05	188.97	187.37	185.91	184.66	183.33	182.34
30	180.63	186.30	191.23	191.32		190.97	188.90	187.32	185.87	184.61	183.30	182.31
31	180.87		191.11	191.26		190.87		187.27		184.56	183.27	
Avg Stage	180.87	183.52	189.51	190.39	191.04	191.55	189.81	188.06	186.53	185.22	183.88	182.75
Max Instantaneous	181	186	192	191	191	192	191	189	187	186	185	183
Max Mean Daily	181	186	192	191	191	192	191	189	187	186	185	183

Average Stage for Water Year 2016: 186.93

Thurston County, Water Resources Div, Technical Services Gp. 360-867-2072

Annual Stage (ft)-- Mean — Max ----- Min —



LRS12--9411 SW Kimmie St

Water Year: 2015

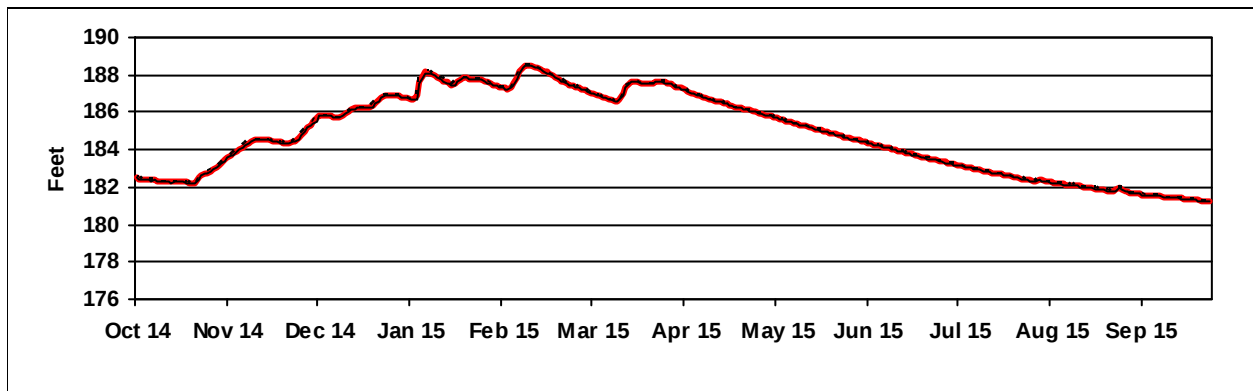
Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	182.49	183.59	185.68	186.77	187.37	187.24	187.43	185.92	184.59	183.38	182.35	181.77
02	182.46	183.70	185.86	186.73	187.33	187.19	187.38	185.88	184.55	183.34	182.31	181.73
03	182.44	183.78	185.88	186.68	187.29	187.12	187.33	185.84	184.50	183.31	182.38	181.70
04	182.43	183.92	185.86	186.85	187.25	187.06	187.28	185.80	184.45	183.27	182.36	181.67
05	182.39	184.02	185.83	187.70	187.32	187.00	187.23	185.75	184.41	183.22	182.33	181.65
06	182.36	184.16	185.78	187.96	187.50	186.95	187.11	185.70	184.36	183.19	182.30	181.64
07	182.37	184.28	185.76	188.13	187.82	186.89	187.06	185.66	184.32	183.15	182.27	181.61
08	182.35	184.38	185.72	188.12	188.21	186.82	186.99	185.60	184.28	183.12	182.25	181.60
09	182.32	184.47	185.74	188.07	188.43	186.77	186.92	185.55	184.25	183.10	182.21	181.58
10	182.30	184.52	185.87	187.98	188.51	186.72	186.88	185.52	184.20	183.07	182.19	181.56
11	182.29	184.56	185.96	187.89	188.54	186.66	186.83	185.47	184.16	183.03	182.16	181.54
12	182.28	184.58	186.05	187.78	188.50	186.59	186.78	185.43	184.13	182.99	182.13	181.53
13	182.26	184.58	186.14	187.70	188.45	186.54	186.74	185.39	184.08	182.95	182.11	181.52
14	182.31	184.55	186.21	187.60	188.38	186.67	186.68	185.34	184.04	182.91	182.14	181.50
15	182.31	184.52	186.25	187.54	188.30	187.00	186.63	185.29	183.99	182.88	182.10	181.49
16	182.30	184.48	186.27	187.47	188.22	187.37	186.59	185.26	183.95	182.85	182.07	181.47
17	182.28	184.46	186.25	187.51	188.13	187.56	186.54	185.22	183.90	182.82	182.05	181.45
18	182.26	184.42	186.23	187.66	188.05	187.62	186.48	185.17	183.88	182.77	182.02	181.43
19	182.24	184.39	186.22	187.76	187.96	187.64	186.44	185.13	183.83	182.74	181.99	181.41
20	182.25	184.36	186.34	187.83	187.88	187.62	186.40	185.09	183.78	182.73	181.98	181.40
21	182.25	184.37	186.52	187.82	187.79	187.59	186.35	185.04	183.75	182.69	181.97	181.39
22	182.47	184.38	186.66	187.78	187.70	187.56	186.29	185.01	183.72	182.66	181.93	181.36
23	182.63	184.44	186.78	187.74	187.62	187.52	186.26	184.96	183.66	182.62	181.90	181.33
24	182.69	184.47	186.87	187.76	187.54	187.52	186.24	184.92	183.64	182.59	181.88	181.31
25	182.78	184.63	186.90	187.75	187.47	187.58	186.20	184.87	183.58	182.56	181.86	181.32
26	182.89	184.79	186.92	187.72	187.41	187.63	186.14	184.82	183.55	182.54	181.82	181.30
27	182.96	185.00	186.92	187.66	187.38	187.65	186.10	184.77	183.52	182.50	181.79	181.27
28	183.08	185.19	186.91	187.60	187.29	187.63	186.07	184.73	183.49	182.46	181.79	181.26
29	183.17	185.34	186.87	187.54		187.60	186.02	184.69	183.44	182.44	181.86	181.24
30	183.27	185.46	186.82	187.48		187.56	185.98	184.65	183.41	182.40	181.98	181.23
31	183.46		186.80	187.42		187.50		184.61		182.37	181.93	

Avg Stage	182.53	184.46	186.29	187.61	187.84	187.24	186.65	185.26	183.98	182.86	182.08	181.48
Max Instantaneous	184	185	187	188	189	188	187	186	185	183	182	182
Max Mean Daily	183	185	187	188	189	188	187	186	185	183	182	182

Average Stage for Water Year 2015: 184.86

Thurston County, Water Resources Div, Technical Services Gp. 360-867-2070

Annual Stage (ft)-- Mean — Max ----- Min —



11/30/2015 8:32:04 AM

LRS12--9411 SW Kimmie St

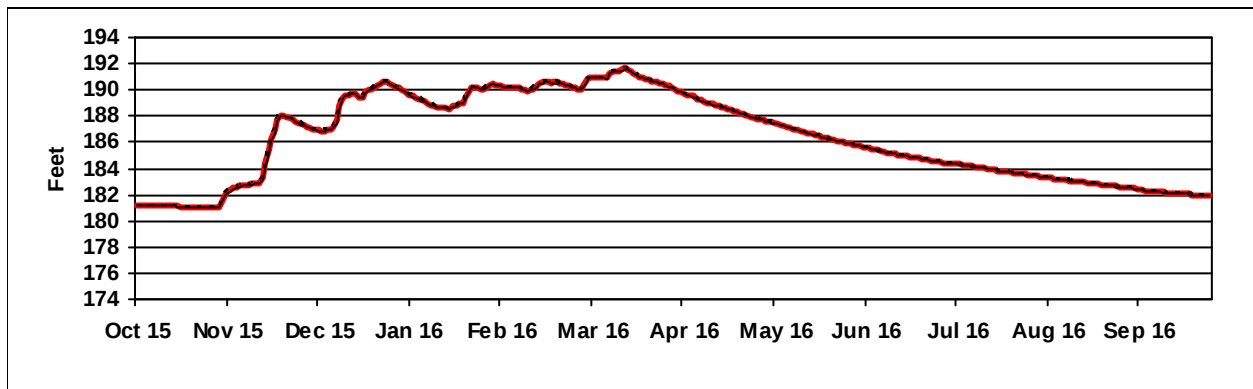
Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	181.21	182.17	186.98	189.75	190.36	190.29	190.05	187.68	185.80	184.44	183.44	182.55
02	181.21	182.34	186.91	189.64	190.28	190.76	189.95	187.60	185.74	184.40	183.41	182.53
03	181.18	182.48	186.90	189.51	190.20	190.97	189.85	187.58	185.69	184.36	183.38	182.50
04	181.16	182.58	186.90	189.43	190.20	190.99	189.74	187.52	185.63	184.32	183.35	182.48
05	181.16	182.64	186.94	189.34	190.22	190.96	189.64	187.45	185.59	184.38	183.32	182.45
06	181.15	182.69	186.99	189.20	190.23	190.92	189.57	187.39	185.54	184.34	183.29	182.45
07	181.17	182.73	187.10	189.07	190.20	190.91	189.50	187.32	185.49	184.31	183.26	182.34
08	181.14	182.76	187.67	188.98	190.15	190.89	189.41	187.25	185.43	184.27	183.23	182.31
09	181.13	182.78	188.82	188.87	190.09	190.94	189.31	187.17	185.38	184.23	183.20	182.28
10	181.20	182.79	189.43	188.77	190.00	191.25	189.21	187.10	185.33	184.20	183.18	182.26
11	181.20	182.84	189.60	188.70	189.91	191.38	189.12	187.05	185.27	184.16	183.15	182.24
12	181.17	182.90	189.61	188.67	189.97	191.36	189.03	186.97	185.22	184.13	183.11	182.22
13	181.14	183.32	189.72	188.65	190.07	191.40	188.97	186.92	185.18	184.09	183.08	182.19
14	181.12	184.31	189.73	188.62	190.27	191.50	188.91	186.84	185.14	184.05	183.06	182.17
15	181.10	185.43	189.59	188.58	190.47	191.64	188.83	186.78	185.11	184.02	183.03	182.14
16	181.09	186.18	189.45	188.64	190.59	191.55	188.76	186.71	185.06	183.98	183.00	182.13
17	181.08	186.98	189.47	188.76	190.64	191.43	188.70	186.65	185.02	183.95	182.97	182.12
18	181.06	187.78	189.82	188.85	190.60	191.30	188.64	186.60	184.98	183.91	182.94	182.11
19	181.06	188.01	189.99	188.91	190.56	191.14	188.56	186.54	184.93	183.88	182.92	182.09
20	181.05	187.99	190.00	188.94	190.58	191.01	188.49	186.49	184.89	183.84	182.90	182.08
21	181.03	187.92	190.20	189.41	190.57	190.93	188.42	186.42	184.85	183.81	182.87	182.06
22	181.03	187.83	190.40	189.94	190.53	190.82	188.34	186.36	184.81	183.78	182.83	182.03
23	181.01	187.73	190.54	190.16	190.49	190.75	188.25	186.30	184.78	183.74	182.80	182.03
24	181.00	187.63	190.70	190.22	190.41	190.71	188.18	186.24	184.73	183.71	182.77	182.01
25	180.98	187.49	190.61	190.17	190.32	190.67	188.10	186.18	184.69	183.68	182.74	181.99
26	181.06	187.38	190.46	190.08	190.23	190.62	188.02	186.12	184.65	183.64	182.71	181.98
27	181.04	187.28	190.34	190.01	190.12	190.54	187.95	186.07	184.60	183.60	182.69	181.95
28	181.03	187.19	190.24	190.22	190.06	190.44	187.88	186.01	184.57	183.58	182.65	181.94
29	181.09	187.08	190.13	190.41	190.04	190.36	187.80	185.96	184.52	183.55	182.63	181.92
30	181.33	186.99	190.00	190.45		190.26	187.73	185.90	184.49	183.51	182.60	181.89
31	181.99		189.86	190.39		190.15		185.85		183.48	182.57	
Avg Stage	181.14	185.21	189.20	189.40	190.29	190.93	188.83	186.74	185.10	183.98	183.00	182.18
Max Instantaneous	182	188	191	190	191	192	190	188	186	184	183	183
Max Mean Daily	182	188	191	190	191	192	190	188	186	184	183	183

Average Stage for Water Year 2016: 186.33

Thurston County, Water Resources Div, Technical Services Gp. 360-867-2072

Annual Stage (ft)-- Mean — Max ----- Min —



MW1--10415 Littlerock Rd SW

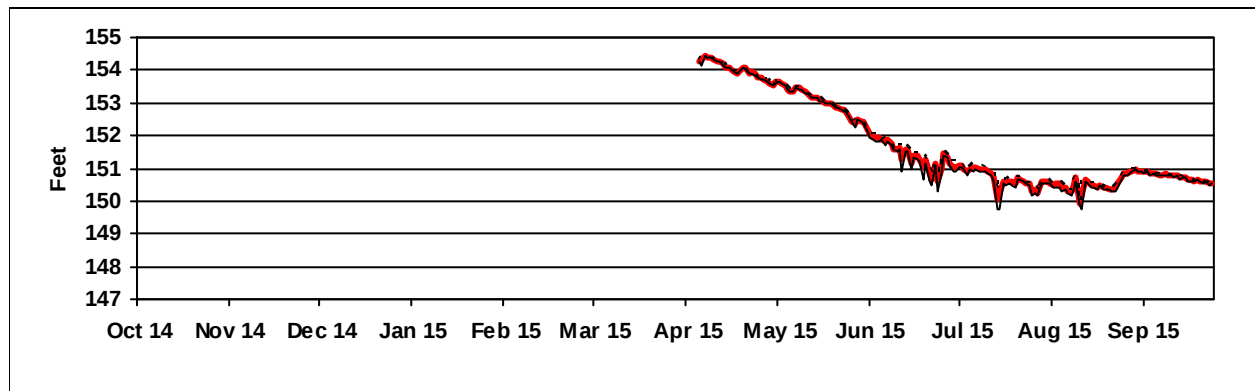
Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01								153.72	152.38	151.44	150.34	150.86
02								153.67	152.49	151.35	150.22	150.89
03								153.60	152.45	151.15	150.60	150.93
04								153.54	152.41	151.06	150.59	150.96
05								153.64	152.19	151.05	150.60	150.93
06								153.64	152.04	151.12	150.56	150.91
07								153.60	151.96	151.12	150.51	150.89
08								153.53	151.94	150.97	150.53	150.90
09							154.29	153.44	151.92	150.90	150.52	150.84
10							154.30	153.37	151.90	150.99	150.42	150.85
11							154.43	153.38	151.84	151.01	150.42	150.83
12							154.41	153.46	151.89	151.02	150.30	150.81
13							154.38	153.46	151.77	150.99	150.29	150.77
14							154.32	153.42	151.61	151.00	150.50	150.82
15							154.27	153.33	151.55	150.95	150.70	150.81
16							154.25	153.29	151.67	150.91	149.91	150.77
17							154.18	153.19	151.25	150.86	150.20	150.76
18							154.11	153.18	151.59	150.75	150.65	150.77
19							154.08	153.17	151.59	150.06	150.58	150.72
20							154.04	153.09	151.17	150.21	150.48	150.70
21							153.96	153.07	151.40	150.59	150.47	150.71
22							153.93	153.01	151.37	150.60	150.45	150.66
23							153.98	152.99	151.27	150.63	150.51	150.65
24							154.10	152.99	151.02	150.58	150.41	150.61
25							154.06	152.89	151.26	150.55	150.43	150.65
26							153.91	152.88	150.82	150.70	150.37	150.62
27							153.95	152.83	150.68	150.69	150.35	150.59
28							153.88	152.78	151.14	150.63	150.41	150.60
29							153.79	152.73	150.58	150.54	150.53	150.54
30							153.77	152.57	150.99	150.52	150.73	150.56
31								152.42		150.31	150.84	
Avg Stage							154.11	153.22	151.60	150.81	150.47	150.76
Max Instantaneous							154	154	152	152	151	151
Max Mean Daily							154	154	152	151	151	151

Average Stage for Water Year 2015: 151.83

Thurston County, Water Resources Div, Technical Services Gp. 360-867-2070

Annual Stage (ft)-- Mean — Max ----- Min —



11/30/2015 8:27:35 AM

MW1--10415 Littlerock Rd SW

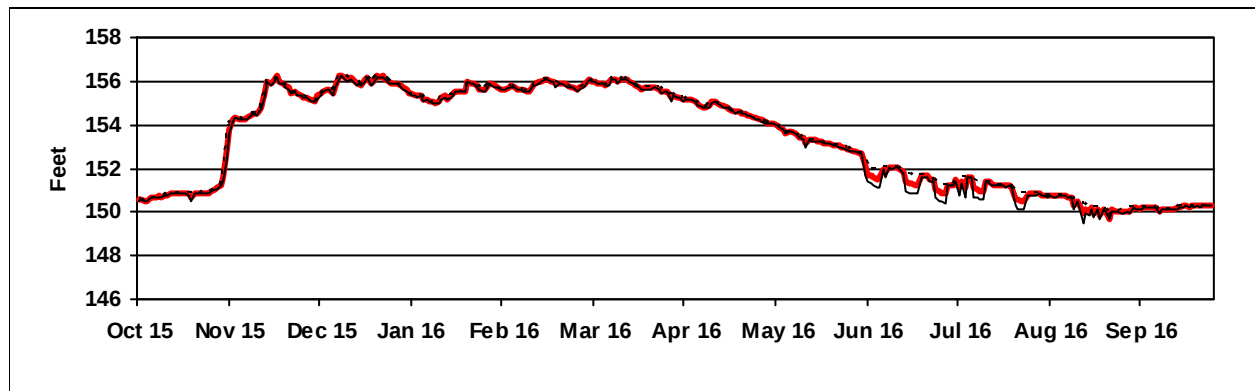
Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	150.54	153.82	155.30	155.45	155.65	155.91	155.29	154.15	152.76	150.83	150.81	150.05
02	150.56	154.21	155.39	155.41	155.61	156.05	155.23	154.07	152.72	151.26	150.83	150.06
03	150.49	154.34	155.57	155.33	155.61	156.02	155.12	154.06	152.67	151.25	150.79	150.19
04	150.50	154.27	155.61	155.32	155.74	155.96	155.17	154.04	152.13	151.22	150.77	150.17
05	150.67	154.26	155.61	155.35	155.76	155.90	155.14	153.96	151.72	151.51	150.73	150.12
06	150.65	154.26	155.48	155.13	155.72	155.91	155.13	153.91	151.64	151.12	150.73	150.17
07	150.68	154.34	155.75	155.13	155.65	155.89	155.08	153.82	151.56	151.45	150.72	150.23
08	150.72	154.45	156.22	155.10	155.61	155.83	154.95	153.63	151.53	151.13	150.74	150.22
09	150.71	154.50	156.28	155.03	155.59	155.97	154.90	153.67	151.57	151.60	150.77	150.23
10	150.76	154.50	156.16	155.00	155.51	156.11	154.82	153.67	151.99	151.57	150.76	150.19
11	150.78	154.61	156.04	155.04	155.56	156.07	154.79	153.61	151.83	151.10	150.80	150.19
12	150.85	154.79	156.13	155.28	155.82	155.96	154.87	153.53	152.03	151.04	150.71	150.05
13	150.86	155.54	156.06	155.30	155.88	156.05	155.03	153.46	152.01	150.99	150.65	150.16
14	150.88	156.03	155.90	155.20	155.97	156.10	155.09	153.39	152.03	150.97	150.34	150.13
15	150.88	155.91	155.88	155.30	156.03	156.08	154.99	153.16	152.02	151.37	150.46	150.11
16	150.87	155.94	155.80	155.45	156.09	155.96	154.93	153.35	151.93	151.37	150.27	150.11
17	150.83	156.24	156.08	155.56	156.06	155.87	154.85	153.30	151.84	151.29	149.94	150.16
18	150.82	155.98	156.16	155.52	155.96	155.79	154.78	153.29	151.36	151.24	150.11	150.18
19	150.68	155.92	155.85	155.54	155.96	155.70	154.71	153.28	151.33	151.26	150.06	150.25
20	150.85	155.77	156.00	155.52	155.85	155.66	154.63	153.25	151.27	151.20	150.18	150.27
21	150.85	155.68	156.25	155.97	155.89	155.67	154.58	153.14	151.26	151.19	149.98	150.28
22	150.86	155.46	156.17	155.93	155.91	155.67	154.60	153.14	151.22	151.18	150.16	150.25
23	150.89	155.53	156.22	155.89	155.86	155.68	154.52	153.14	151.65	151.24	149.85	150.29
24	150.87	155.41	156.12	155.76	155.76	155.74	154.49	153.07	151.64	151.15	150.11	150.27
25	150.85	155.33	155.94	155.64	155.73	155.71	154.45	153.02	151.64	150.62	150.06	150.32
26	150.96	155.28	155.91	155.59	155.72	155.66	154.44	153.01	151.52	150.56	149.68	150.28
27	151.06	155.23	155.91	155.62	155.61	155.52	154.37	152.99	151.46	150.50	150.10	150.30
28	151.10	155.20	155.88	155.89	155.68	155.55	154.31	152.95	151.01	150.48	150.05	150.31
29	151.23	155.14	155.77	155.87	155.79	155.50	154.25	152.91	150.92	150.80	150.01	150.29
30	151.62	155.10	155.67	155.78		155.25	154.20	152.83	150.88	150.82	150.00	150.29
31	152.89		155.58	155.69		155.35		152.81		150.83	150.05	
Avg Stage	150.90	155.10	155.89	155.47	155.78	155.81	154.79	153.41	151.70	151.10	150.36	150.20
Max Instantaneous	153	156	156	156	156	156	155	154	153	152	151	150
Max Mean Daily	153	156	156	156	156	156	155	154	153	152	151	150

Average Stage for Water Year 2016: 153.38

Thurston County, Water Resources Div, Technical Services Gp. 360-867-2072

Annual Stage (ft)-- Mean — Max ----- Min —



10/06/2016 1:36:41 PM

MW3--3623 104TH Ave SW (Jones)

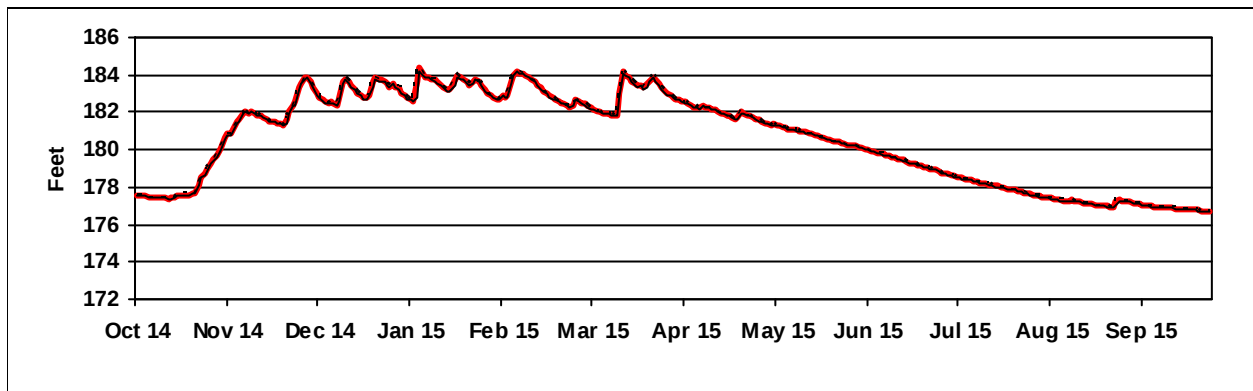
Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	177.59	180.82	183.04	182.77	182.70	182.45	182.80	181.52	180.23	178.78	177.59	177.24
02	177.56	180.86	182.78	182.67	182.91	182.42	182.71	181.45	180.19	178.73	177.56	177.21
03	177.53	181.07	182.65	182.62	182.84	182.32	182.68	181.39	180.13	178.68	177.52	177.19
04	177.51	181.46	182.54	183.62	182.94	182.21	182.60	181.34	180.09	178.64	177.50	177.17
05	177.47	181.62	182.52	184.35	183.67	182.14	182.53	181.36	180.05	178.58	177.48	177.12
06	177.45	181.95	182.53	184.03	184.01	182.08	182.44	181.33	180.00	178.55	177.45	177.11
07	177.47	182.01	182.45	183.91	184.17	182.04	182.39	181.28	179.94	178.51	177.40	177.07
08	177.45	181.98	182.41	183.84	184.11	181.99	182.30	181.21	179.89	178.47	177.38	177.04
09	177.44	182.06	182.75	183.78	184.04	181.93	182.24	181.15	179.84	178.44	177.34	176.99
10	177.41	181.97	183.60	183.71	183.95	181.90	182.31	181.10	179.78	178.41	177.31	176.98
11	177.41	181.87	183.77	183.62	183.87	181.88	182.38	181.06	179.75	178.37	177.29	176.95
12	177.38	181.80	183.63	183.48	183.78	181.84	182.30	181.05	179.71	178.34	177.26	176.94
13	177.43	181.73	183.42	183.31	183.66	181.87	182.28	181.04	179.67	178.30	177.24	176.93
14	177.50	181.64	183.22	183.18	183.46	182.99	182.17	181.01	179.61	178.25	177.30	176.91
15	177.57	181.54	183.04	183.27	183.29	184.15	182.10	180.97	179.56	178.22	177.26	176.90
16	177.60	181.49	182.88	183.34	183.12	183.98	182.05	180.93	179.52	178.18	177.22	176.88
17	177.61	181.46	182.76	183.76	182.99	183.85	181.98	180.88	179.47	178.14	177.21	176.88
18	177.61	181.42	182.83	183.92	182.85	183.70	181.92	180.82	179.43	178.08	177.16	176.86
19	177.61	181.38	182.87	183.81	182.75	183.50	181.86	180.78	179.38	178.06	177.13	176.85
20	177.64	181.35	183.66	183.73	182.66	183.40	181.81	180.74	179.32	178.04	177.13	176.83
21	177.66	181.61	183.82	183.61	182.58	183.48	181.74	180.67	179.28	178.01	177.11	176.82
22	178.14	182.00	183.72	183.47	182.50	183.30	181.67	180.63	179.25	177.98	177.07	176.80
23	178.51	182.39	183.74	183.66	182.43	183.53	181.68	180.59	179.19	177.93	177.04	176.79
24	178.69	182.56	183.70	183.77	182.37	183.70	182.05	180.55	179.16	177.89	177.03	176.77
25	178.93	183.28	183.53	183.64	182.31	183.89	181.96	180.49	179.09	177.86	177.01	176.78
26	179.28	183.49	183.36	183.44	182.36	183.73	181.87	180.45	179.04	177.83	176.97	176.76
27	179.44	183.81	183.57	183.21	182.72	183.50	181.81	180.40	179.00	177.79	176.95	176.74
28	179.73	183.87	183.34	183.03	182.56	183.30	181.70	180.34	178.98	177.76	176.95	176.73
29	179.91	183.64	183.32	182.90		183.10	181.63	180.30	178.91	177.71	177.24	176.72
30	180.13	183.36	183.06	182.78		182.97	181.57	180.24	178.87	177.67	177.32	176.71
31	180.63		182.90	182.69		182.88		180.20		177.62	177.23	
Avg Stage	178.11	182.05	183.14	183.45	183.13	182.90	182.12	180.88	179.54	178.19	177.25	176.92
Max Instantaneous	181	184	184	185	184	184	183	182	180	179	178	177
Max Mean Daily	181	184	184	184	184	184	183	182	180	179	178	177

Average Stage for Water Year 2015: 180.64

Thurston County, Water Resources Div, Technical Services Gp. 360-867-2070

Annual Stage (ft)-- Mean — Max ----- Min —



11/30/2015 8:19:19 AM

MW3--3623 104TH Ave SW (Jones)

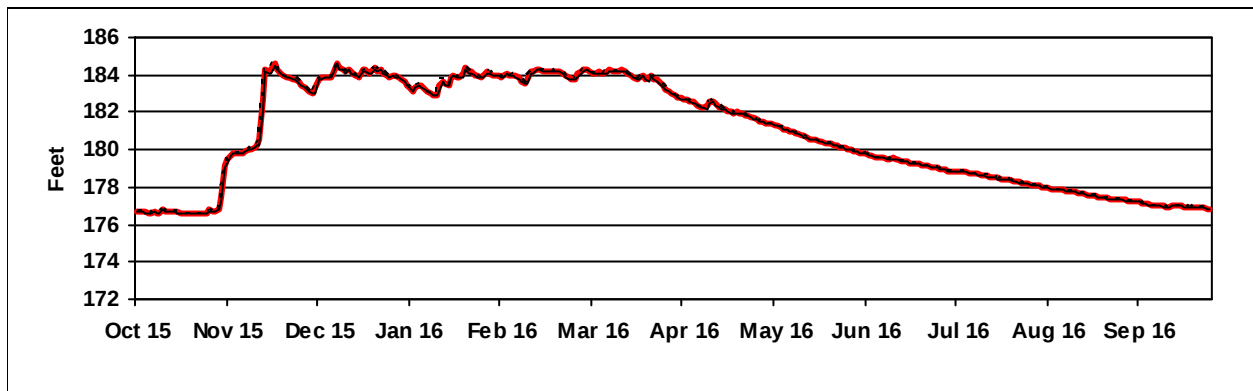
Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	176.70	179.44	183.34	183.46	183.93	184.30	182.87	181.52	179.94	178.96	178.11	177.30
02	176.69	179.73	183.72	183.30	183.87	184.25	182.77	181.44	179.89	178.93	178.07	177.28
03	176.67	179.81	183.81	183.16	183.95	184.16	182.75	181.43	179.85	178.89	178.05	177.26
04	176.65	179.84	183.85	183.37	184.06	184.09	182.74	181.38	179.81	178.86	178.01	177.24
05	176.64	179.84	183.83	183.48	184.02	184.08	182.65	181.32	179.78	178.89	177.98	177.23
06	176.63	179.85	183.88	183.40	184.02	184.14	182.60	181.27	179.72	178.86	177.95	177.26
07	176.70	179.95	184.08	183.21	183.92	184.09	182.53	181.20	179.68	178.84	177.93	177.12
08	176.64	180.02	184.60	183.12	183.81	184.03	182.45	181.13	179.64	178.83	177.92	177.09
09	176.63	180.05	184.41	183.01	183.69	184.21	182.37	181.07	179.61	178.81	177.90	177.08
10	176.81	180.09	184.34	182.91	183.55	184.24	182.30	181.01	179.59	178.78	177.87	177.07
11	176.75	180.20	184.17	182.94	183.77	184.16	182.24	180.95	179.55	178.75	177.84	177.04
12	176.73	180.53	184.25	183.46	184.16	184.14	182.35	180.88	179.53	178.71	177.81	177.01
13	176.70	182.70	184.20	183.68	184.18	184.16	182.57	180.82	179.50	178.68	177.78	177.00
14	176.67	184.29	184.00	183.49	184.30	184.25	182.58	180.76	179.54	178.64	177.75	176.97
15	176.65	184.21	183.93	183.47	184.27	184.15	182.42	180.71	179.50	178.62	177.73	176.96
16	176.63	184.25	183.88	183.91	184.23	184.05	182.31	180.65	179.45	178.58	177.70	176.94
17	176.62	184.65	184.26	183.98	184.23	183.99	182.22	180.60	179.42	178.55	177.66	177.07
18	176.61	184.27	184.26	183.87	184.19	183.90	182.14	180.57	179.39	178.53	177.63	177.00
19	176.60	184.09	184.06	183.90	184.21	183.77	182.08	180.52	179.36	178.50	177.60	177.02
20	176.60	183.98	184.13	184.03	184.20	183.82	182.01	180.49	179.31	178.47	177.58	176.99
21	176.58	183.89	184.37	184.37	184.17	183.96	181.95	180.43	179.29	178.44	177.56	176.96
22	176.58	183.84	184.19	184.15	184.18	183.80	182.00	180.38	179.27	178.42	177.53	176.94
23	176.57	183.79	184.29	184.16	184.11	183.83	181.97	180.34	179.24	178.39	177.50	176.96
24	176.56	183.80	184.12	183.99	183.96	183.96	181.92	180.30	179.20	178.36	177.47	176.95
25	176.56	183.62	183.97	183.92	183.82	183.79	181.86	180.24	179.18	178.33	177.43	176.93
26	176.76	183.44	183.91	183.88	183.79	183.72	181.80	180.20	179.14	178.30	177.41	176.90
27	176.69	183.33	184.01	183.99	183.77	183.61	181.75	180.17	179.09	178.26	177.39	176.89
28	176.74	183.25	183.93	184.16	184.04	183.41	181.68	180.12	179.05	178.22	177.37	176.88
29	176.78	183.15	183.85	184.12	184.14	183.26	181.62	180.07	179.02	178.19	177.35	176.86
30	177.47	183.05	183.75	184.00		183.13	181.56	180.03	179.00	178.17	177.32	176.84
31	179.12		183.62	183.94		183.00		179.98		178.14	177.31	
Avg Stage	176.77	182.23	184.03	183.67	184.02	183.92	182.24	180.71	179.45	178.58	177.69	177.03
Max Instantaneous	179	185	185	184	184	184	183	182	180	179	178	177
Max Mean Daily	179	185	185	184	184	184	183	182	180	179	178	177

Average Stage for Water Year 2016: 180.86

Thurston County, Water Resources Div, Technical Services Gp. 360-867-2072

Annual Stage (ft)-- Mean — Max ----- Min —



10/06/2016 1:39:23 PM

MW5--800 93rd Ave SE

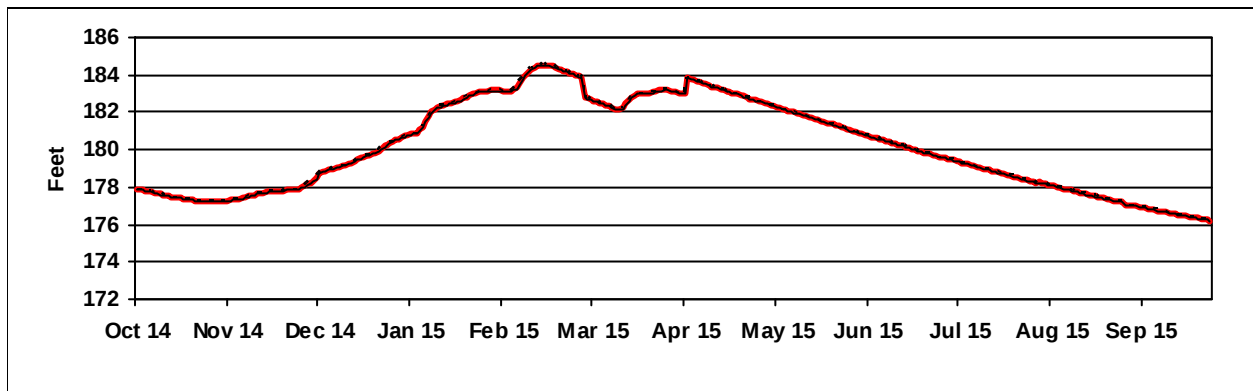
Water Year: 2015

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	177.90	177.29	178.54	180.78	183.17	183.86	183.11	182.56	181.00	179.62	178.29	177.07
02	177.87	177.30	178.73	180.82	183.15	182.83	183.08	182.51	180.96	179.58	178.24	177.07
03	177.84	177.32	178.81	180.85	183.11	182.75	183.05	182.45	180.89	179.53	178.26	177.05
04	177.82	177.34	178.86	180.89	183.11	182.68	183.02	182.41	180.85	179.48	178.22	177.01
05	177.78	177.38	178.91	181.08	183.13	182.62	183.00	182.36	180.80	179.43	178.18	176.97
06	177.75	177.41	178.95	181.24	183.20	182.55	183.88	182.29	180.75	179.39	178.13	176.95
07	177.68	177.46	179.00	181.56	183.30	182.50	183.80	182.25	180.70	179.35	178.10	176.91
08	177.64	177.51	179.03	181.82	183.55	182.44	183.72	182.19	180.65	179.30	178.06	176.88
09	177.62	177.55	179.07	182.01	183.81	182.38	183.66	182.14	180.61	179.27	178.01	176.84
10	177.57	177.60	179.12	182.15	184.01	182.35	183.62	182.09	180.56	179.23	177.97	176.81
11	177.56	177.64	179.19	182.25	184.21	182.26	183.55	182.05	180.51	179.18	177.93	176.78
12	177.52	177.67	179.24	182.32	184.33	182.17	183.51	182.01	180.47	179.13	177.88	176.75
13	177.49	177.70	179.31	182.39	184.43	182.14	183.47	181.96	180.42	179.09	177.85	176.73
14	177.47	177.72	179.40	182.43	184.48	182.10	183.38	181.90	180.37	179.04	177.83	176.69
15	177.44	177.73	179.48	182.48	184.52	182.22	183.32	181.84	180.32	179.00	177.79	176.67
16	177.41	177.75	179.55	182.49	184.55	182.47	183.30	181.80	180.27	178.96	177.75	176.64
17	177.39	177.78	179.62	182.53	184.54	182.68	183.24	181.74	180.24	178.91	177.71	176.61
18	177.37	177.79	179.68	182.58	184.50	182.81	183.19	181.69	180.19	178.86	177.66	176.57
19	177.33	177.81	179.72	182.65	184.46	182.91	183.16	181.64	180.14	178.81	177.62	176.54
20	177.31	177.82	179.79	182.75	184.41	182.99	183.12	181.61	180.09	178.79	177.60	176.51
21	177.29	177.83	179.85	182.84	184.33	183.01	183.06	181.54	180.04	178.75	177.56	176.49
22	177.28	177.84	179.94	182.91	184.28	183.05	182.99	181.50	180.00	178.70	177.51	176.45
23	177.26	177.85	180.06	182.96	184.21	183.06	182.97	181.45	179.94	178.65	177.47	176.41
24	177.25	177.86	180.18	183.02	184.14	183.04	182.91	181.40	179.90	178.61	177.44	176.38
25	177.25	177.90	180.28	183.09	184.08	183.07	182.85	181.36	179.84	178.57	177.40	176.36
26	177.24	177.97	180.37	183.14	184.06	183.12	182.79	181.30	179.80	178.54	177.36	176.33
27	177.23	178.05	180.47	183.15	184.01	183.17	182.74	181.25	179.77	178.49	177.32	176.29
28	177.22	178.15	180.55	183.16	183.92	183.17	182.70	181.20	179.73	178.45	177.29	176.27
29	177.22	178.25	180.60	183.17		183.19	182.65	181.16	179.67	178.40	177.28	176.24
30	177.24	178.34	180.66	183.17		183.20	182.60	181.10	179.62	178.37	177.24	176.21
31	177.26		180.72	183.17		183.16		181.04		178.32	177.21	
Avg Stage	177.47	177.72	179.60	182.32	183.96	182.77	183.18	181.80	180.30	178.96	177.75	176.65
Max Instantaneous	178	178	181	183	185	184	184	183	181	180	178	177
Max Mean Daily	178	178	181	183	185	184	184	183	181	180	178	177

Average Stage for Water Year 2015: 180.21

Thurston County, Water Resources Div, Technical Services Gp. 360-867-2070

Annual Stage (ft)-- Mean — Max ----- Min —



11/30/2015 8:14:04 AM

MW5--800 93rd Ave SE

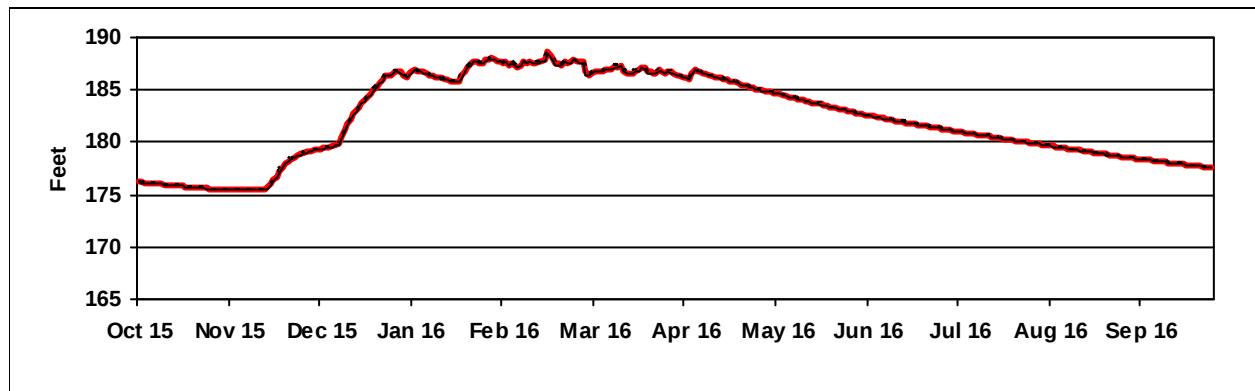
Water Year: 2016

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
01	176.19	175.51	179.29	186.50	187.62	186.78	186.46	184.91	182.83	181.23	179.84	178.56
02	176.17	175.53	179.34	186.70	187.57	186.46	186.36	184.83	182.76	181.20	179.80	178.52
03	176.13	175.55	179.41	186.87	187.70	186.60	186.27	184.82	182.69	181.14	179.76	178.48
04	176.10	175.54	179.46	186.82	187.41	186.73	186.14	184.75	182.64	181.10	179.72	178.45
05	176.09	175.52	179.53	186.74	187.56	186.82	186.03	184.68	182.59	181.04	179.68	178.41
06	176.07	175.51	179.61	186.68	187.27	186.84	186.54	184.60	182.52	181.00	179.64	178.38
07	176.04	175.51	179.70	186.53	187.22	186.84	186.90	184.53	182.47	180.96	179.60	178.36
08	176.02	175.49	179.89	186.43	187.41	186.87	186.82	184.44	182.40	180.92	179.56	178.32
09	175.99	175.48	180.47	186.32	187.65	186.96	186.71	184.36	182.35	180.87	179.51	178.28
10	175.96	175.47	181.19	186.21	187.52	187.01	186.59	184.28	182.28	180.82	179.47	178.25
11	175.93	175.47	181.76	186.13	187.67	187.24	186.49	184.23	182.22	180.78	179.43	178.22
12	175.91	175.46	182.24	186.09	187.60	187.22	186.39	184.15	182.18	180.73	179.39	178.18
13	175.88	175.49	182.67	186.02	187.61	187.37	186.34	184.08	182.13	180.68	179.34	178.15
14	175.87	175.65	183.05	185.95	187.64	186.82	186.27	184.00	182.07	180.64	179.30	178.12
15	175.83	176.01	183.41	185.87	187.74	186.57	186.15	183.93	182.04	180.59	179.25	178.07
16	175.82	176.39	183.74	185.83	187.97	186.48	186.09	183.83	181.97	180.56	179.22	178.04
17	175.78	176.72	184.03	185.86	188.58	186.66	186.03	183.77	181.93	180.52	179.17	178.01
18	175.76	177.21	184.33	185.86	188.31	186.85	185.95	183.72	181.87	180.46	179.13	177.97
19	175.73	177.65	184.66	186.30	187.93	186.90	185.88	183.67	181.82	180.42	179.09	177.93
20	175.70	177.97	184.96	186.85	187.46	187.08	185.79	183.61	181.77	180.38	179.05	177.90
21	175.66	178.22	185.31	187.16	187.49	187.11	185.73	183.53	181.72	180.34	179.01	177.87
22	175.65	178.42	185.63	187.47	187.37	186.67	185.62	183.45	181.68	180.29	178.96	177.83
23	175.62	178.60	186.00	187.77	187.67	186.67	185.51	183.39	181.63	180.24	178.91	177.80
24	175.60	178.74	186.39	187.69	187.57	186.59	185.44	183.32	181.57	180.21	178.88	177.76
25	175.57	178.84	186.44	187.59	187.65	186.64	185.35	183.24	181.53	180.17	178.84	177.74
26	175.54	178.94	186.44	187.58	187.85	186.94	185.28	183.19	181.48	180.12	178.80	177.71
27	175.52	179.04	186.82	187.82	187.72	186.74	185.21	183.12	181.44	180.07	178.76	177.67
28	175.49	179.12	186.72	187.87	187.71	186.63	185.12	183.06	181.38	180.02	178.71	177.64
29	175.47	179.18	186.67	188.07	187.72	186.72	185.04	183.00	181.33	179.99	178.67	177.60
30	175.44	179.25	186.35	187.85		186.67	184.95	182.93	181.29	179.94	178.64	177.57
31	175.44		186.26	187.75		186.56		182.88		179.90	178.60	
Avg Stage	175.81	176.92	183.28	186.81	187.66	186.81	185.98	183.88	182.02	180.56	179.22	178.06
Max Instantaneous	176	179	187	188	189	187	187	185	183	181	180	179
Max Mean Daily	176	179	187	188	189	187	187	185	183	181	180	179

Average Stage for Water Year 2016: 182.25

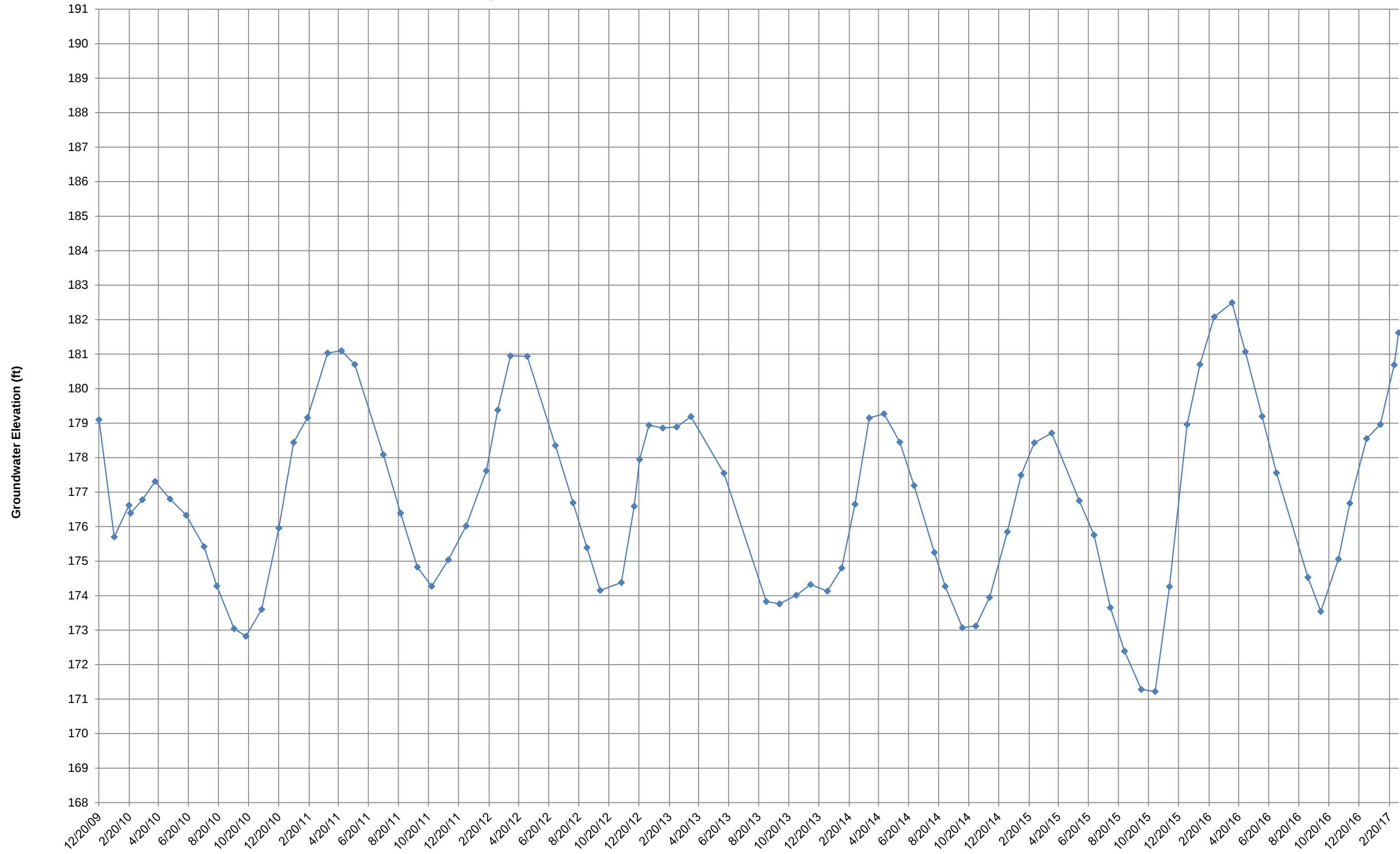
Thurston County, Water Resources Div, Technical Services Gp. 360-867-2072

Annual Stage (ft)-- Mean — Max ----- Min —

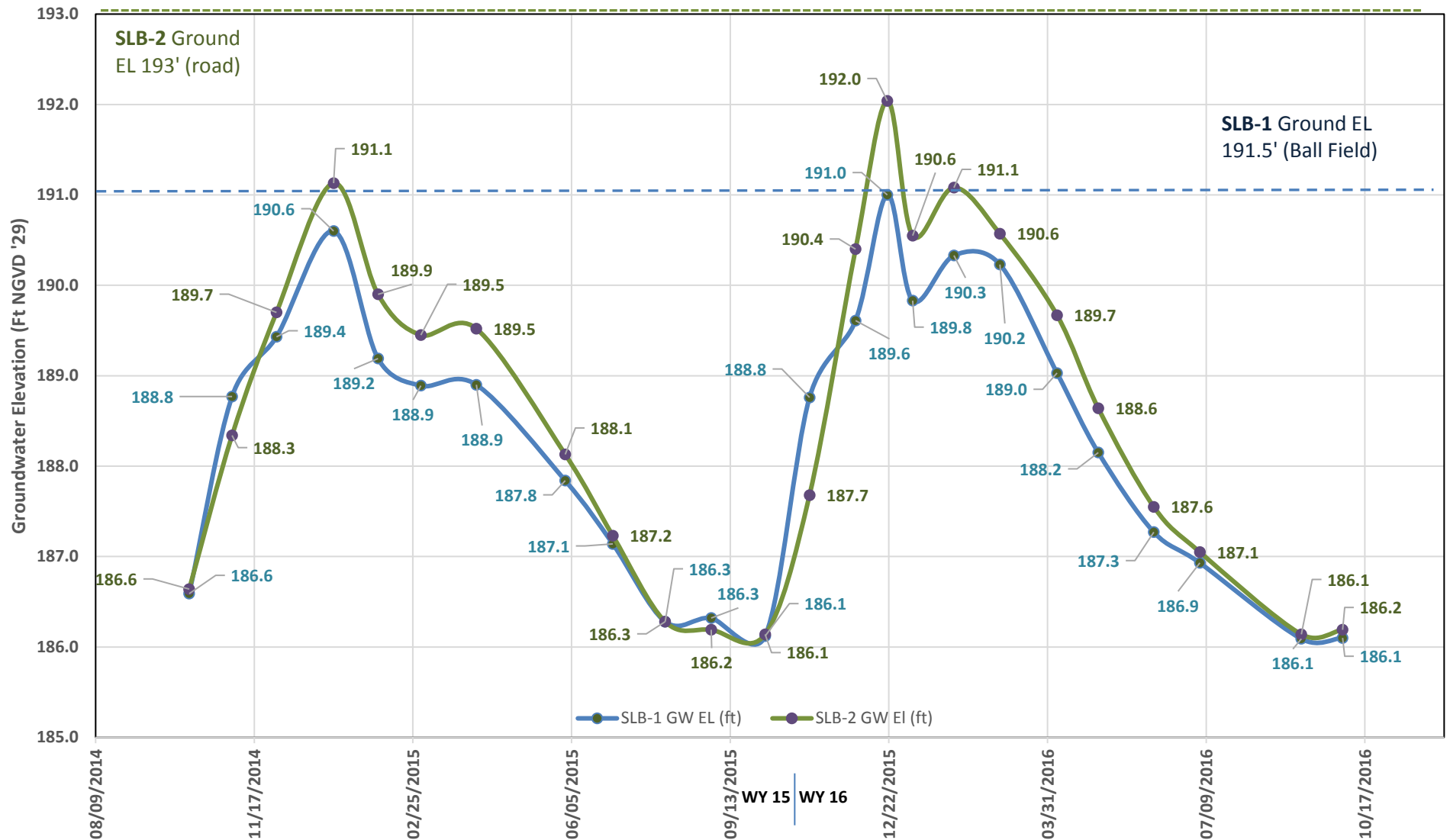


10/06/2016 1:41:37 PM

LRS-01a, Salmon Creek Groundwater Study; 6841 Foster Dr. SW; Well depth 23.42 ft; Ground elevation 190.60 f
Complete History of Manual Tape Down Groundwater Elevation Data



Scott Lake Groundwater Elevation WY 2015 - 2016



Appendix D

APPENDIX D – Lake Level Data

This Appendix contains manually collected data as well as automated lake level and elevation data for three lakes in Thurston County. These lakes are Lake St. Clair located east of Lacey, Long Lake, located in the southeast urban growth area of Lacey and Black Lake, located in the City of Tumwater or in the Tumwater UGA. These three lakes are monitored for lake level because the potential exists for high water to impact significant numbers of residents who live along the shores of these lakes. These three lakes are monitored for surface elevations because they are: in densely populated areas; have unique geologic, topographic, recreational, or natural resource features that are of great interest to a large population of citizens. Below is a brief summary of each lake.

- **Lake St. Clair** in particular is of great interest to many residents because in recent years, the lake level has been rising to historic high levels. It is a trend that began in 2005 and continues through the 2016 Water Year. A graph showing the lake elevation from 1988 – 2016 is included because the thirty year period of record better illustrates lake level cycles, showing the current elevation compared to previous decades. The unique feature of Lake St Clair is its size and depth. Also, the fact that it has no surface outlet and drains only to groundwater also makes it a unique body of water susceptible to both groundwater fluctuations as well as precipitation and surface water events.
- **Long Lake** is another lake that is of great interest to residents who live along its shores for similar reasons. The lake elevation has also been rising in the winter months for the past several years. Long Lake, however, *does* have a surface outlet as well as a sizeable groundwater component that also drains water from the tri-lake system of which it is a part.
- **Black Lake** is located almost entirely in bedrock that was scoured by glaciers thousands of years ago. It has a large and very active contributory area from the Black Hills immediately to its west. It is also located within a very large wetland complex which accommodates subsurface flow to the south of the lake. The only surface flow out of Black Lake is a man-made ditch (Black Lake Ditch) which accommodates active drainage of the uppermost four or five feet of the lake surface to Puget Sound. As this is the only open outflow draining the lake, it is prone to obstructions, primarily from beaver dams. These dams regularly occlude Black Ditch resulting in substantial, rapid rise in lake level. The dams are regularly maintained to prevent major flooding of residents along the lakeshore.

The common misconception is that Black River also accommodates surface flow from Black Lake. This is actually not the case. The wetland complexes at the south end of the lake have accumulated significant organic detritus over thousands of years to make passage directly from the lake to Black River impossible. Drainage does occur Southward through the wetland complexes and as groundwater, making a significant contribution to the main stem of the Black River as it heads south towards Littlerock and on to the confluence with the Chehalis River near Rochester.

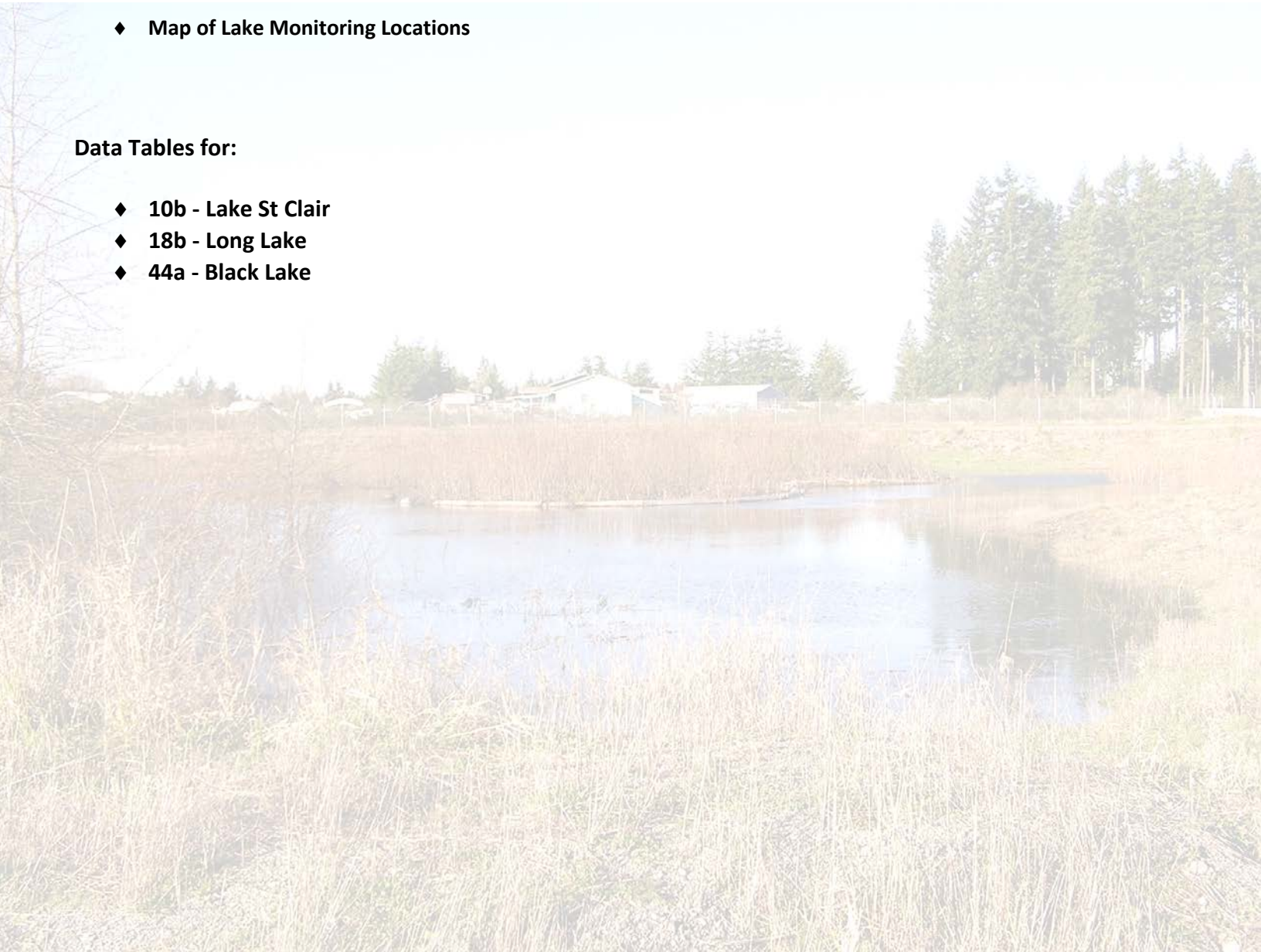
Summary Report and Analysis of Water Years 2015 – 2016 including: Atmospheric, Streamflow, Groundwater and Lake Level
Data –Thurston County Environmental Monitoring Program

Appendix D contains the following information:

- ◆ **Map of Lake Monitoring Locations**

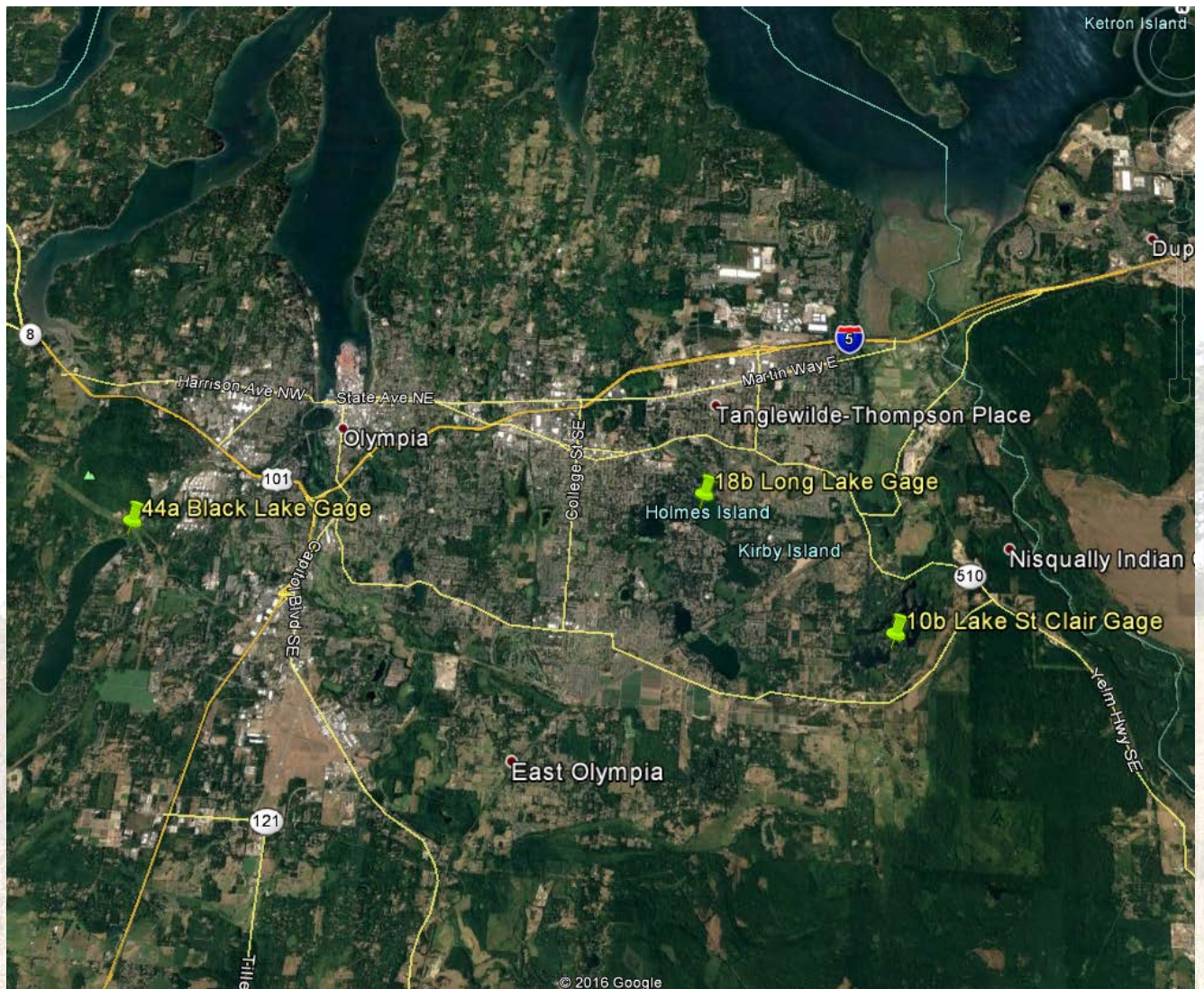
Data Tables for:

- ◆ **10b - Lake St Clair**
- ◆ **18b - Long Lake**
- ◆ **44a - Black Lake**



Summary Report and Analysis of Water Years 2015 – 2016 including: Atmospheric, Streamflow, Groundwater and Lake Level Data –Thurston County Environmental Monitoring Program

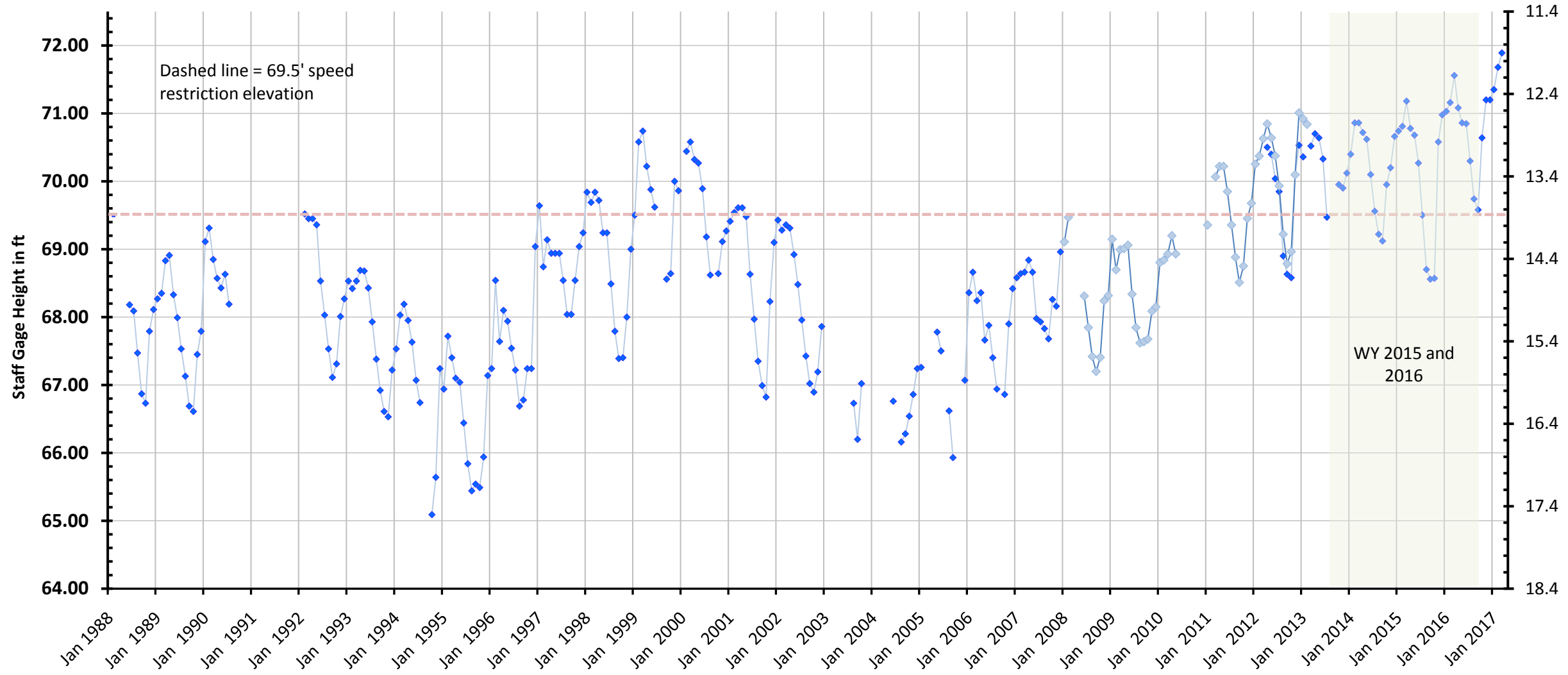
Map of Lake Level Monitoring Locations



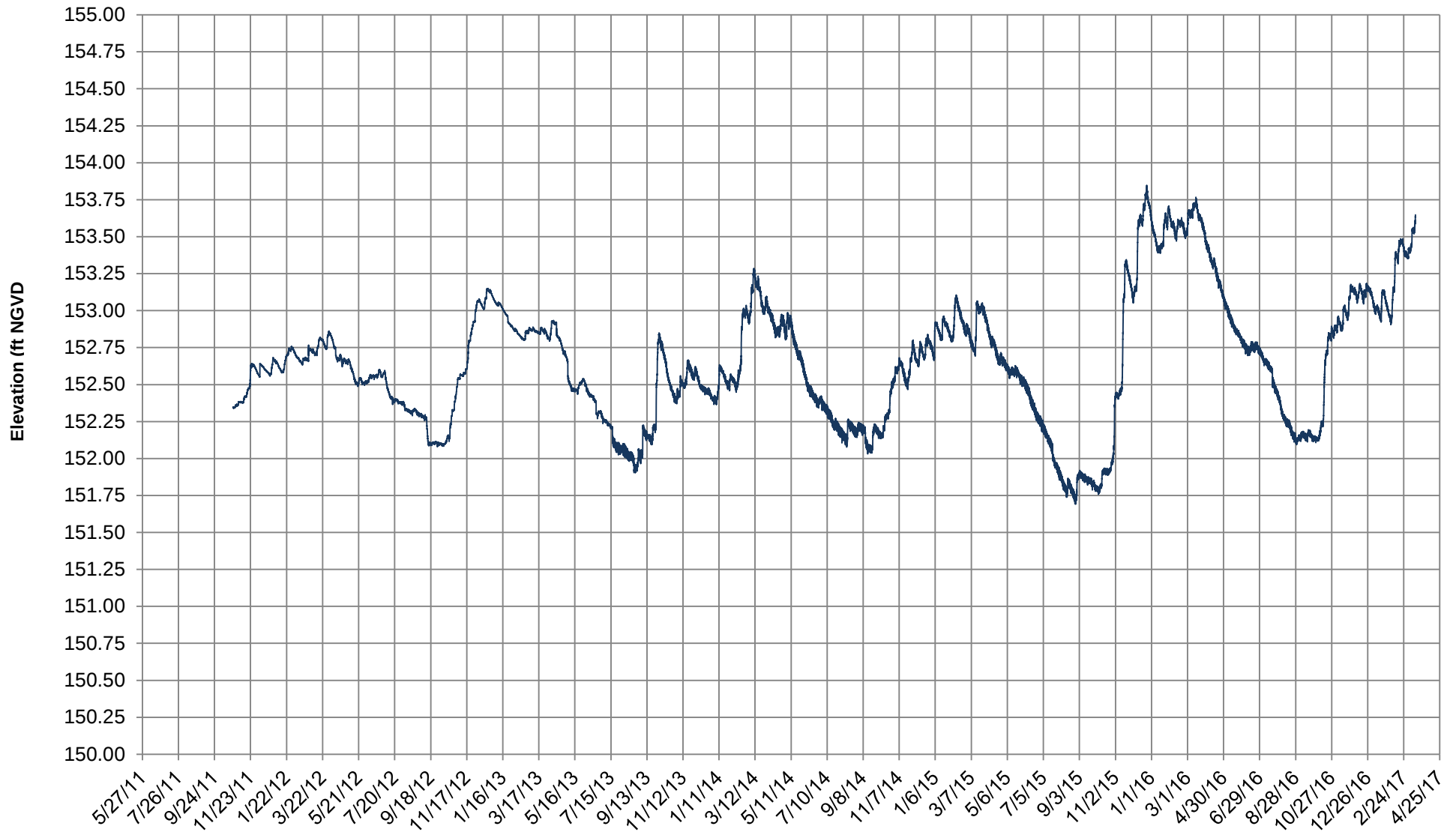
Lake Level Data Sheets for WY 2015 -2016



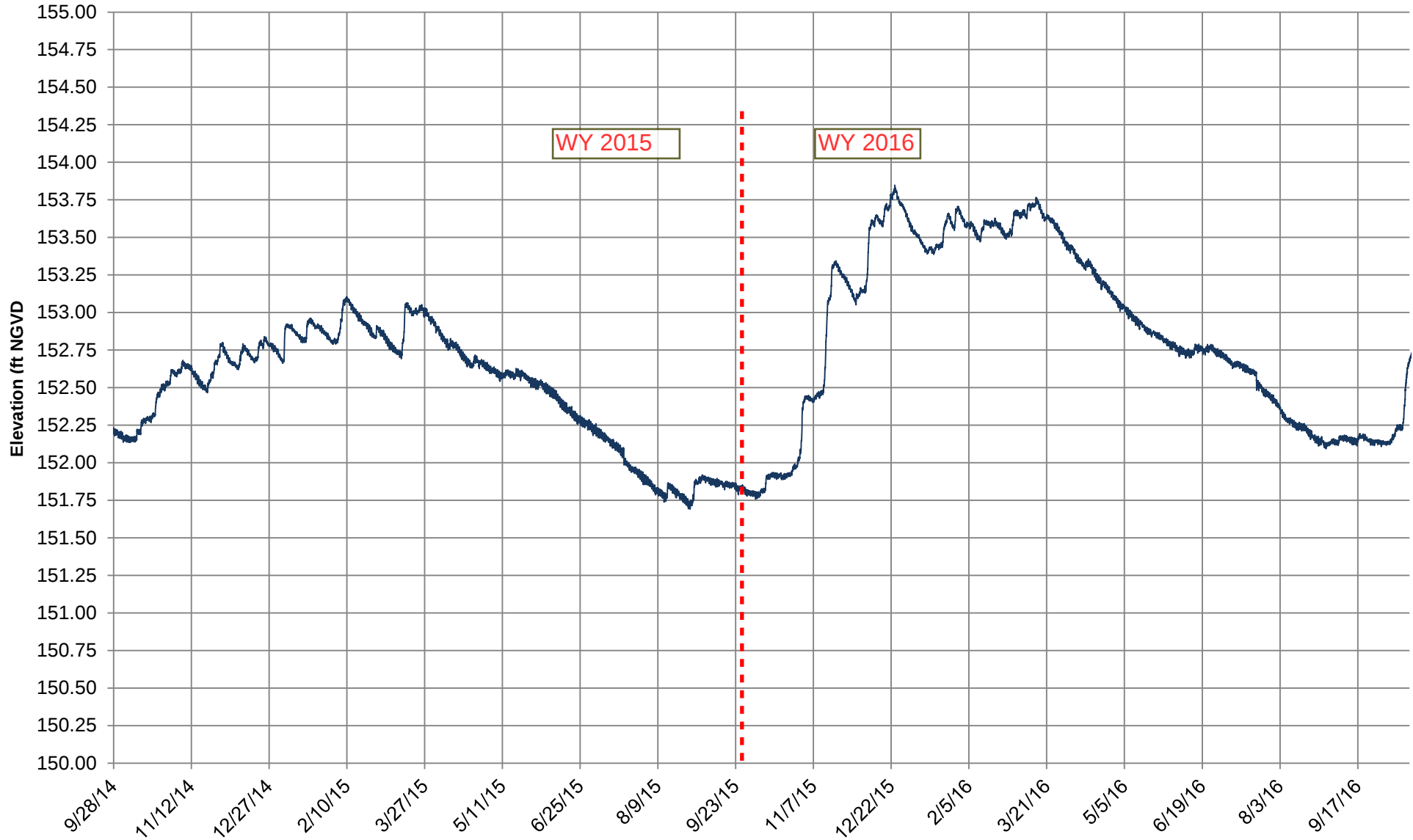
Lake Saint Clair
Water Elevations Observed at
Peninsula Dr Bridge
1988 - 2016



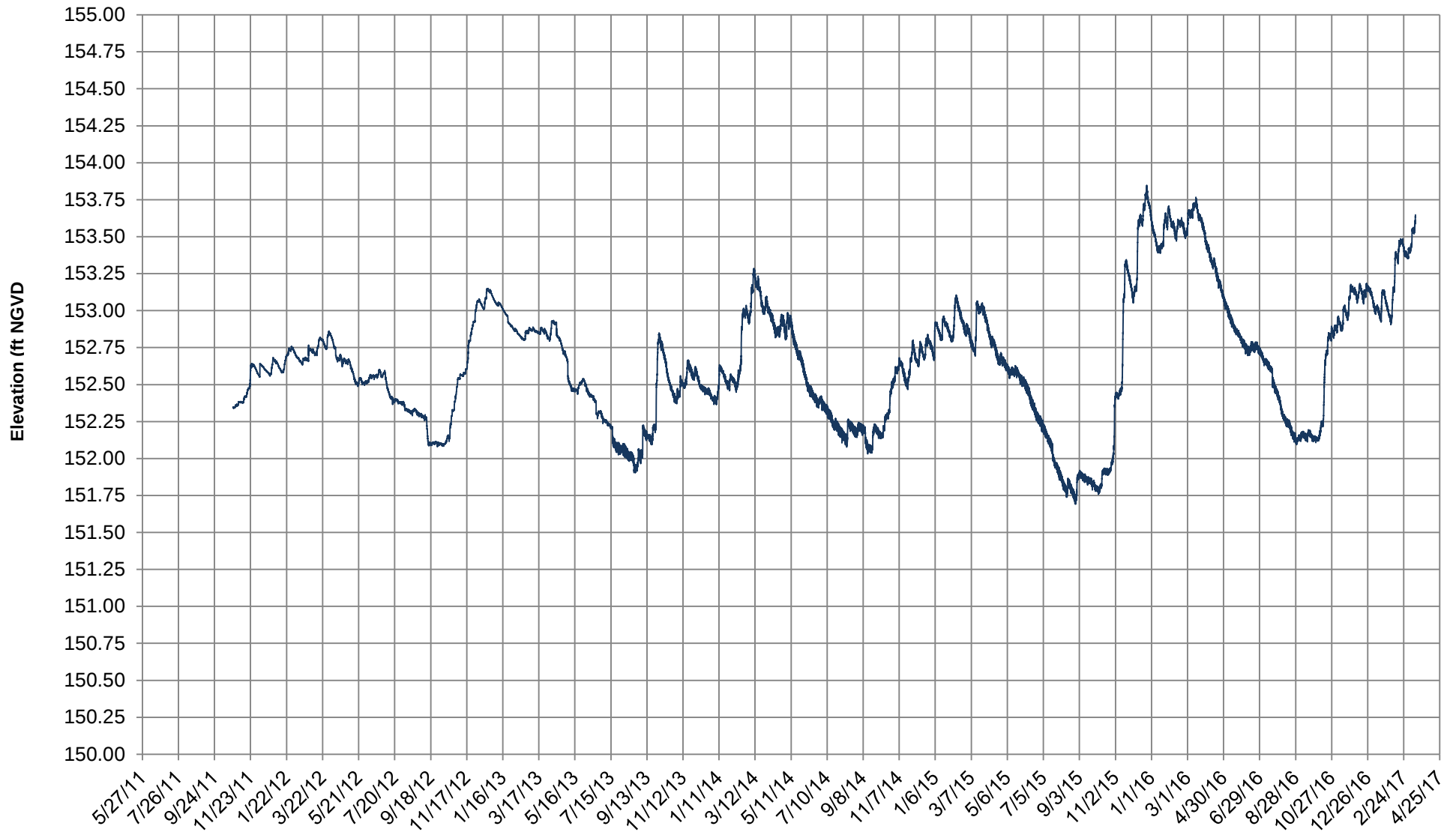
Long Surface Elevation Lake at Holmes Island Bridge 2011 - 2017



Long Lake Surface Elevation at Holmes Island Bridge WY 2015 -2016



Long Lake Surface Elevation at Holmes Island Bridge 2011 - 2017



Summary Report for WY 2015 - 2016
Lakes
Black Lake (44a) Outlet at Belmore Road
Water Year 2015 and 2016

